October 7, 1946

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

EDITORIAL INDEX, PAGE 73

CHNOLOGY DEPT:

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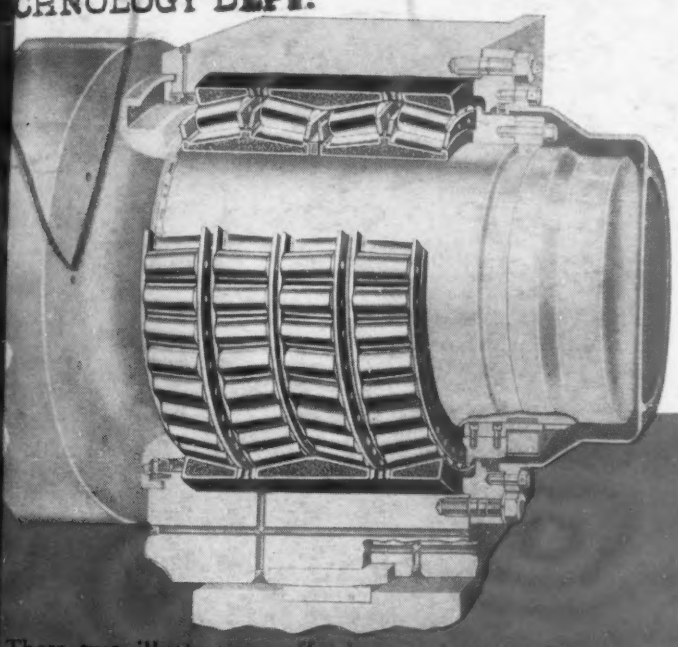
TO-DAY



These two illustrations afford a good comparison — as far as appearance is concerned — between the Timken Balanced Proportion Bearing and the Timken Bearing that preceded it.

For this contrast we selected 4-row bearings of the same outside diameter; but there the similarity ends.

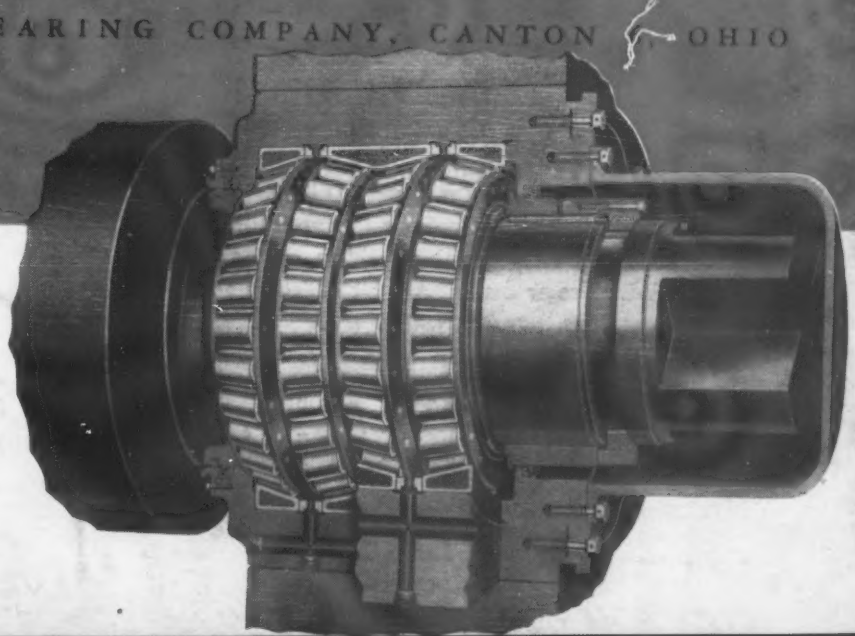
The principal features of balanced proportion design — the features that have revolutionized rolling mill bearing performance — are plainly discernible in the upper picture.

There you can see the great number of longer rolls, the larger bore, the increased overall width that so greatly increase the bearing's separating force capacity while decreasing roll neck stress and deflection to a corresponding degree.

Yesterday's Timken Roll Neck Bearing still is a good bearing — second only to the Timken Balanced Proportion Bearing in performance, endurance and economy. It will continue to give a good account of itself wherever now installed.

THE TIMKEN ROLLER BEARING COMPANY, CANTON OHIO

YESTERDAY



"PACKAGE" PUMP

...of unlimited applications!

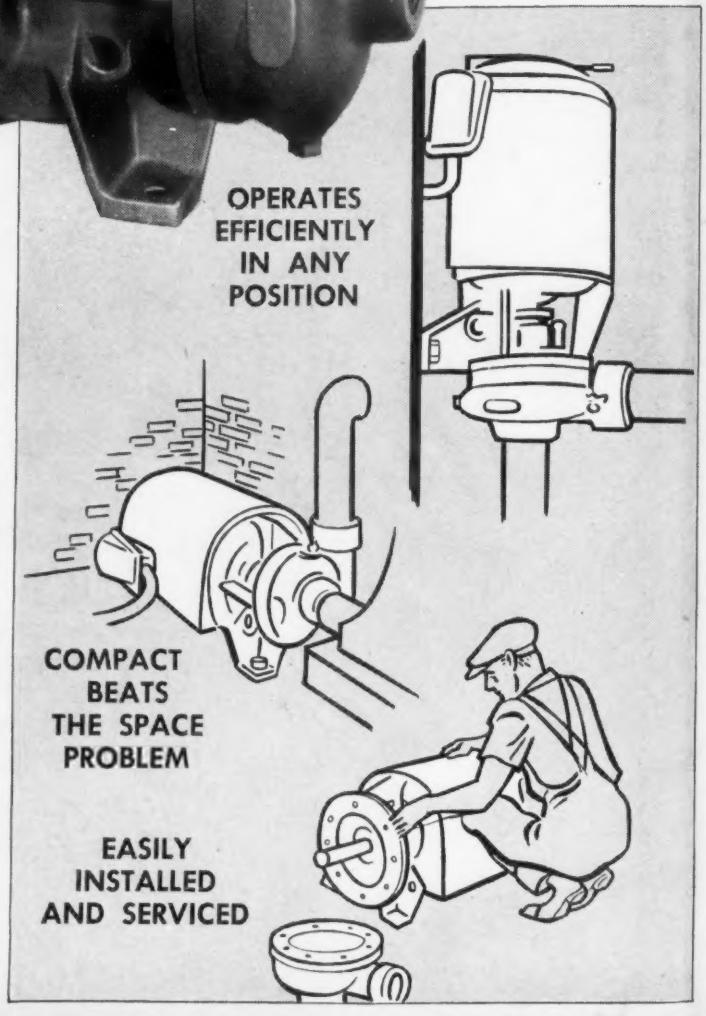
"Electrifugal" principle saves space.. cuts costs

BUILDING BOTH pump and motor on the same shaft — in one rigid frame — does *more* than assure compactness, perfect alignment and lower initial cost. It gives you a pump of almost unlimited uses... available in stock sizes from ¾ to 25 h. p.

Allis-Chalmers builds both pump and motor — thoroughly tests each unit for capacity, efficiency and head. For a wide range of pumping jobs, Allis-Chalmers "Electrifugal" pumps will save you money — in first cost — in installation — in operation and maintenance.

PUMPS FOR EVERY PURPOSE

Allis-Chalmers designs and builds a complete line of centrifugal pumps and motors . . . assumes undivided responsibility for their performance. Single or double suction, single and multi-stage, capacities up to 170,000 gpm. For help on any pumping problem, call on your nearest A-C office or dealer. Ask for bulletin B6059. ALLIS-CHALMERS, MILWAUKEE 1, WIS.



A 2085

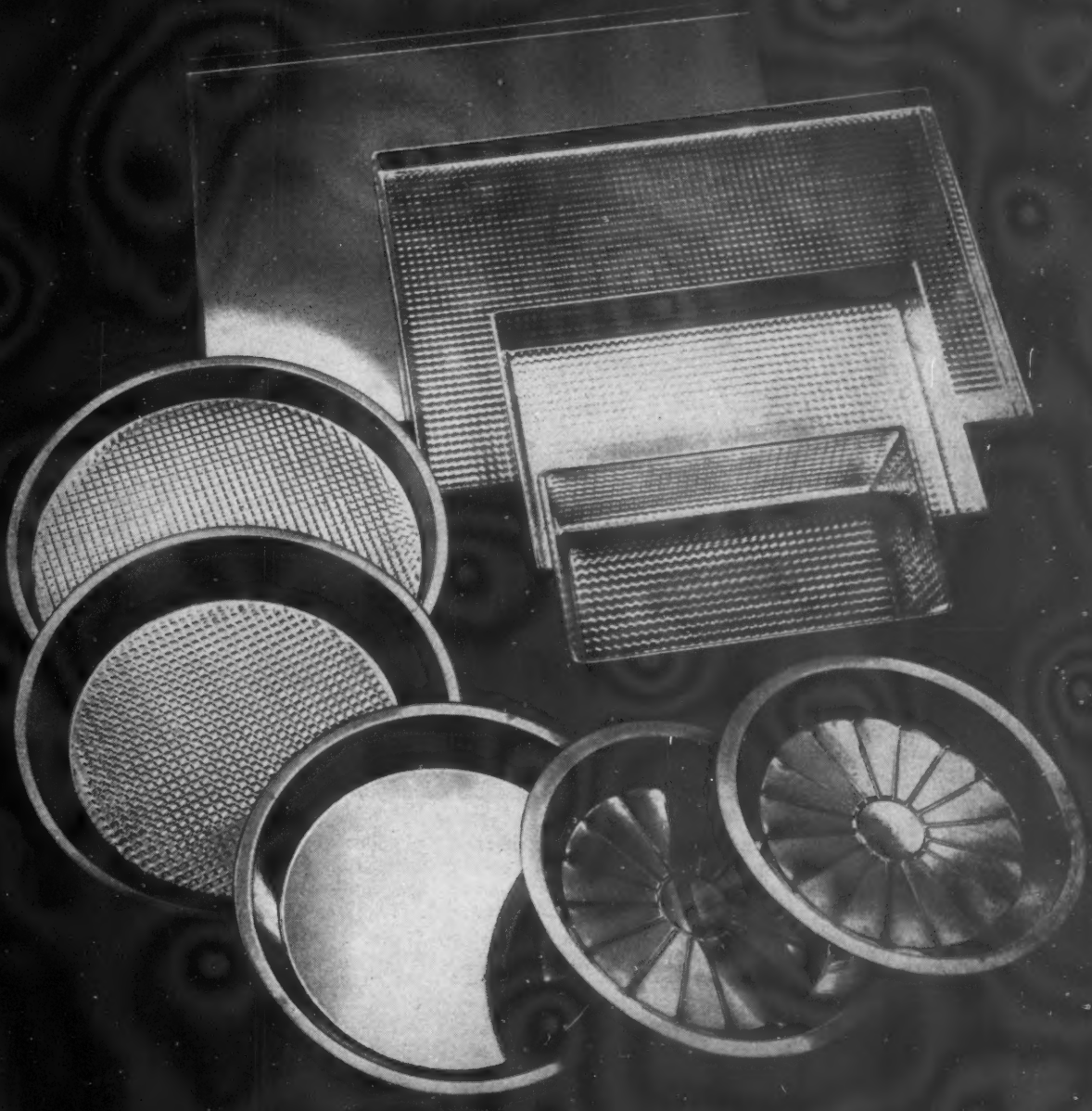
ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment
★ Biggest of All in Range of Industrial Products ★

Electrifugal PUMPS

BETHLEHEM TIN MILL PRODUCTS

form and stamp easily



BETHLEHEM STEEL COMPANY

BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

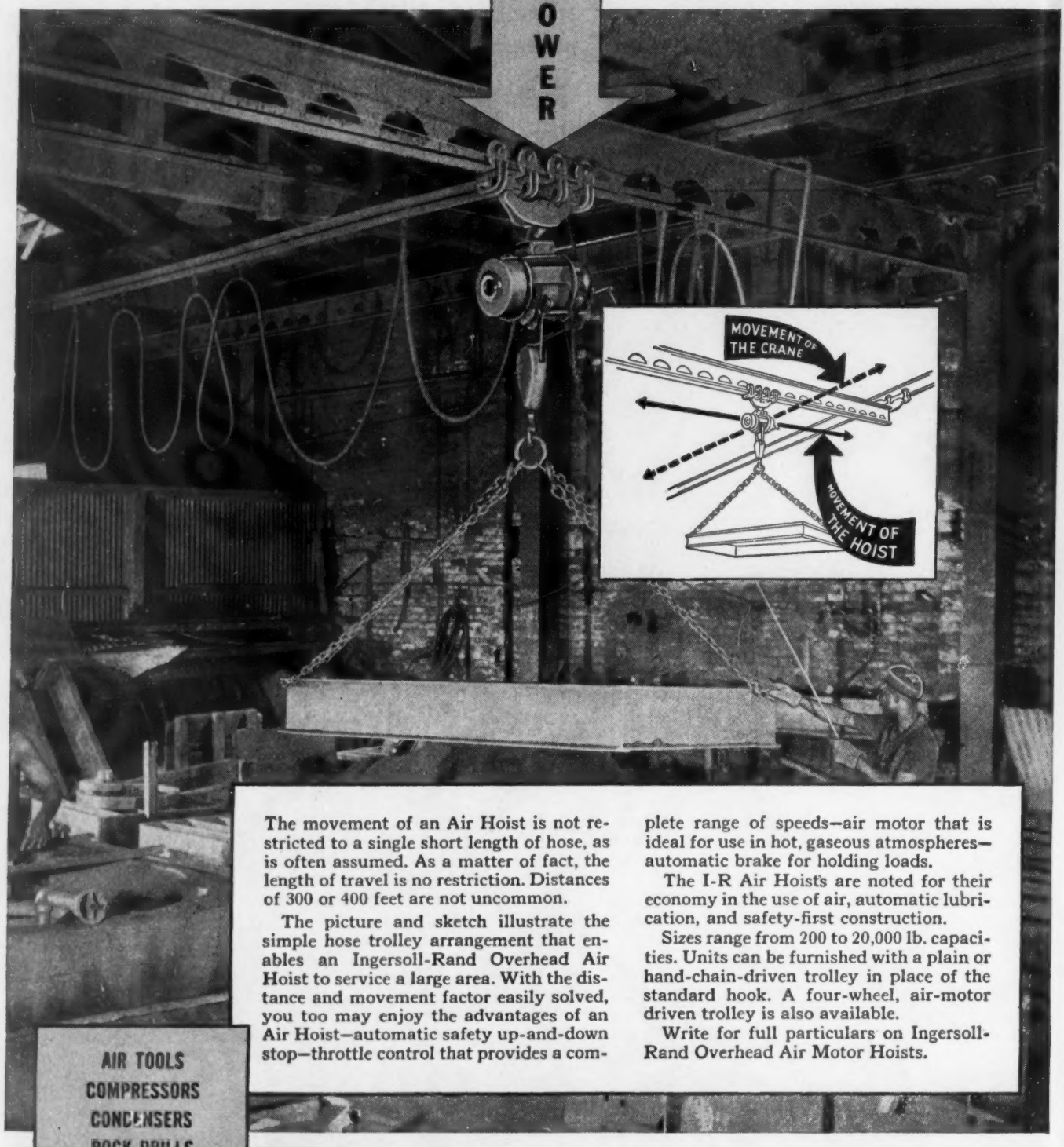
Bethlehem Steel Export Corporation, New York City

BETHLEHEM STEEL

Don't overlook the MOVE of an Air Hoist..

LIFT

LOWER



The movement of an Air Hoist is not restricted to a single short length of hose, as is often assumed. As a matter of fact, the length of travel is no restriction. Distances of 300 or 400 feet are not uncommon.

The picture and sketch illustrate the simple hose trolley arrangement that enables an Ingersoll-Rand Overhead Air Hoist to service a large area. With the distance and movement factor easily solved, you too may enjoy the advantages of an Air Hoist—automatic safety up-and-down stop—throttle control that provides a complete range of speeds—air motor that is ideal for use in hot, gaseous atmospheres—automatic brake for holding loads.

The I-R Air Hoists are noted for their economy in the use of air, automatic lubrication, and safety-first construction.

Sizes range from 200 to 20,000 lb. capacities. Units can be furnished with a plain or hand-chain-driven trolley in place of the standard hook. A four-wheel, air-motor driven trolley is also available.

Write for full particulars on Ingersoll-Rand Overhead Air Motor Hoists.

AIR TOOLS
COMPRESSORS
CONDENSERS
ROCK DRILLS
TURBO BLOWERS
CENTRIFUGAL PUMPS
OIL & GAS ENGINES

SEVENTY-FIFTH ANNIVERSARY

Ingersoll-Rand

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8-928

A development of
B.F.Goodrich
FIRST IN RUBBER

Shepherd Diesel Marine "Caterpillar" Dual Drive

Quiet! Fishermen at work

A typical example of B. F. Goodrich development in rubber

YOU'RE way under water in that picture—those are the engines below the water line in a new commercial fishing boat. Most engines turn the propeller through chain or gear drives. But they cost a lot to maintain; breakdowns waste time and are dangerous. And the noise from these drives scares away the fish.

B. F. Goodrich had long been recommending, for use in industry, Multi-V belt drives—a number of carefully matched rubber-and-cord belts that are quiet and vibration-free; that are clean and require no maintenance. Why wouldn't a drive like this be good for fishing boats?

Shepherd Diesel Marine installed one in a new boat—and found the answer. They *are* good for fishing boats. They last longer, cost less to operate, weigh less—and they make the boat so quiet that the "take" of fish is greater—the crew can catch a boat load, get to shore, and be back at work again hours and sometimes days sooner.

B. F. Goodrich first developed the V belts to drive the fan of your car; now these belts also drive boats, and equipment of almost every kind in thousands of plants and on thousands of farms. This sort of development work is going on always at B. F. Goodrich. It is applied to the improvement of everything made of rubber, and that is why you're sure of the latest improvements when you specify B. F. Goodrich to your distributor. *The B. F. Goodrich Company, Industrial Products Division, Akron, Ohio.*

B.F.Goodrich
RUBBER *and* SYNTHETIC *products*

Behind the Scenes...

Orchids for Industry

You may be having trouble getting that new car, refrigerator or radio. You may not think this country is producing much, these days, and we'll agree that we've had our troubles, and are still having them, in getting the storekeepers to sell us the things we need. However, we've been looking at some figures which show the tremendous volume of these things our plants are now producing, and we can't help but be a little bit proud of the job our manufacturers are doing in the face of tremendous obstacles. By the end of July, for example, they had turned out more than seven million radios, nearly three million electric irons, and more than a million each of washing machines, vacuum cleaners and refrigerators. They are actually making more tires, washing machines, vacuum cleaners, stoves, radios and irons each month than they made before the war. That's based on an average for the whole year to date, and there's hardly a single item on which production this month will not surpass by a wide margin the pre-war levels. In the face of continued strikes, price confusion, material shortages and other major headaches, we think you'll agree that the peacetime job of this industry of ours is living up in every way to the tremendous job accomplished during the war. We aren't yet out of the woods, but if we look closely, there's a bit of daylight ahead.

Spy Scare

The clan Shrdlu keeps poking its nose into the public print in the most inopportune spots. One of our good readers down Pittsburgh way sends in an item which he claims must be about our Japanese cousin, related to us on the Etaoin side. At any rate, in among the stock quotations the other day he spied a listing of the stock of Vulcan Detinning Co., which was quoted that particular day as "Etaoinaoinoi". No wonder Vulcan was off 8½ points that particular day. Enough to scare any investor, timid or brave.

Lower Noticed Articles

At the risk of being overly heavy in this column on items from abroad, we will quote one more of these endless appeals from overseas firms for American goods to sell to a ravaged world. This gem is headed, "Budapest, capital of Hungary, Date of Stamp." That's a new wrinkle in predating your correspondence, but in this particular case it didn't work, because the uncooperative Hungarian postal service failed to cancel the stamp so there's no date on it. The message says further, "We are wholesale dealers in the lower noticed articles. Kindly give us offers. Speedy and agreeing answer awaiting, we are with many thanks yours truly." And, down at the bottom, are the "lower noticed articles," among which are tubes, pipes, fittings, valves and cocks for drainsoll-rain-hot-coldwater-steam; brass for bathingrooms; gaswaterheaters; and important specialties for alcohol, distilleries, If we weren't more than superficially interested in the American language, we probably wouldn't even look twice at these things. We are, and these dictionary-derived translations accent the wide gap between what we consider "accepted" usage and what the dictionary defines as correct.

Consider the Aesthetic Values

We have been taken to task on the score of unearthing a very old piece of equipment and foisting it on an unsuspecting (!) public as new in our recent photo of a dog anchor. Harley McGee, peripatetic peddler from up Detroit way, points the finger at us and claims that Hector was tied to that gadget when he was a pup. Okay, okay, so he means we're bad—but we claim the end was worth it. That is, of course, to those of us who enjoy beautiful marine scenery.

Now We Know

We're sleeping better these nights, thank you, since L. B. (Bethlehem) Shapleigh explained to us what happened to that extra dollar, which was lost in the puzzle noted here a couple of weeks back. Seems that it is just another case of wrong association. When you put the $27 the men paid the hotel alongside the $2 that the bellhop filched, you immediately see the sum of $29. But, as our fourth grade teacher used to try to drum into our heads, you can't add bananas and apples without first getting the common denominator. In this case, you can't add the $27 and the $2, because they don't belong together. It's all very confusing, unless you have a good explainer like Mr. S. on tap to keep you straightened out.

Shrdlu

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STEEL

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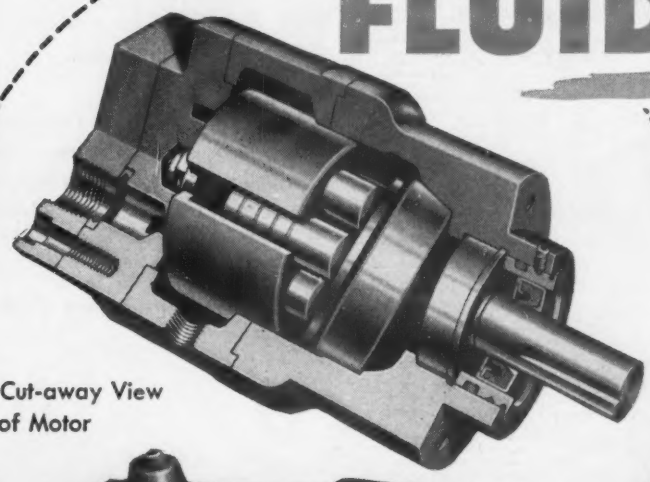
Editorial Staff on Contents Page

DENISON HydrOILic

FLUID MOTORS



Cut-away View of Motor

Motor with Gear Head and Speed Control

HIGH efficiency at LOW cost in *Fluid Motors* for dozens of needs..

WHEREVER rotary power can be applied, Denison HydrOILic Fluid Motors offer freedom from shock-load problems—stepless speed variation—instant speed-up for rapid-traverse needs, and many other advantages!

An exclusive feature of these fluid motors is the unique "floating drive" construction. It provides *constant pressure contact* between the driving and driven elements *without mechanical linkages of any kind!* Sudden starts, stops or reversals can't cause distortion or breakage; destructive backlash or inertia is eliminated.

Equipped with speed control, the motors may be preset to operate constantly at any speed within their capacity, and that speed may be increased or reduced as desired while the motor is in operation.

Quick speed-up for rapid-traverse needs is provided by a plunger device interlocked with the speed-control valve. It permits instant acceleration from any pre-set speed to full-speed operation, for any desired interval. Releasing the plunger causes the motor to resume its pre-set speed.

The motors may be stopped, started or reversed at any time without affecting their speed setting or the operation of the speed-up control. Motors are also fully self-starting from any stopped position. The plunger may be activated by lever, cam, or linkage arrangement (not included with speed control valve assembly).

The motor itself operates in a bath of oil, and normal slippage provides continuous circulation of oil through the gear-box—the entire unit is completely self-lubricating. Helical gears assure smooth, quiet operation and minimum wear.

Denison HydrOILic Fluid Motors are compact, ruggedly-built units in 3 and 5 h.p. sizes, available with or without speed-control valve and gear-head drive. Gear ratios—1:3, 3:1, 1:1.5, 1.5:1. Write for complete details!

* * *

The Denison Engineering Company, 1163 Dublin Road, Columbus 16, Ohio.

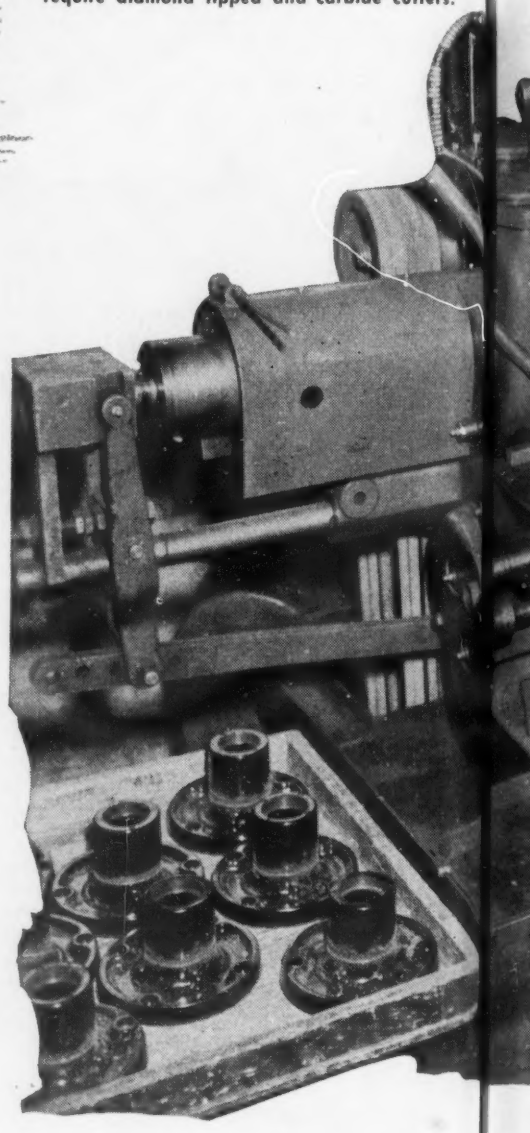
DENISON EQUIPMENT in APPLIED HydrOILics

Total maintenance cost for 7

THE MACHINE: A Warner & Swasey No. 3 Universal Turret Lathe.

ITS SERVICE: 7 years continuous operation with 5 consecutive years on a 3-shift basis and the balance on 2 shifts... equivalent to over 19 years of single-shift operation.

THE JOBS: Turning plastic parts that require diamond tipped and carbide cutters.



THIS low-cost maintenance record was made on a No. 3 Warner & Swasey at the General Industries Corporation, Elyria, Ohio.

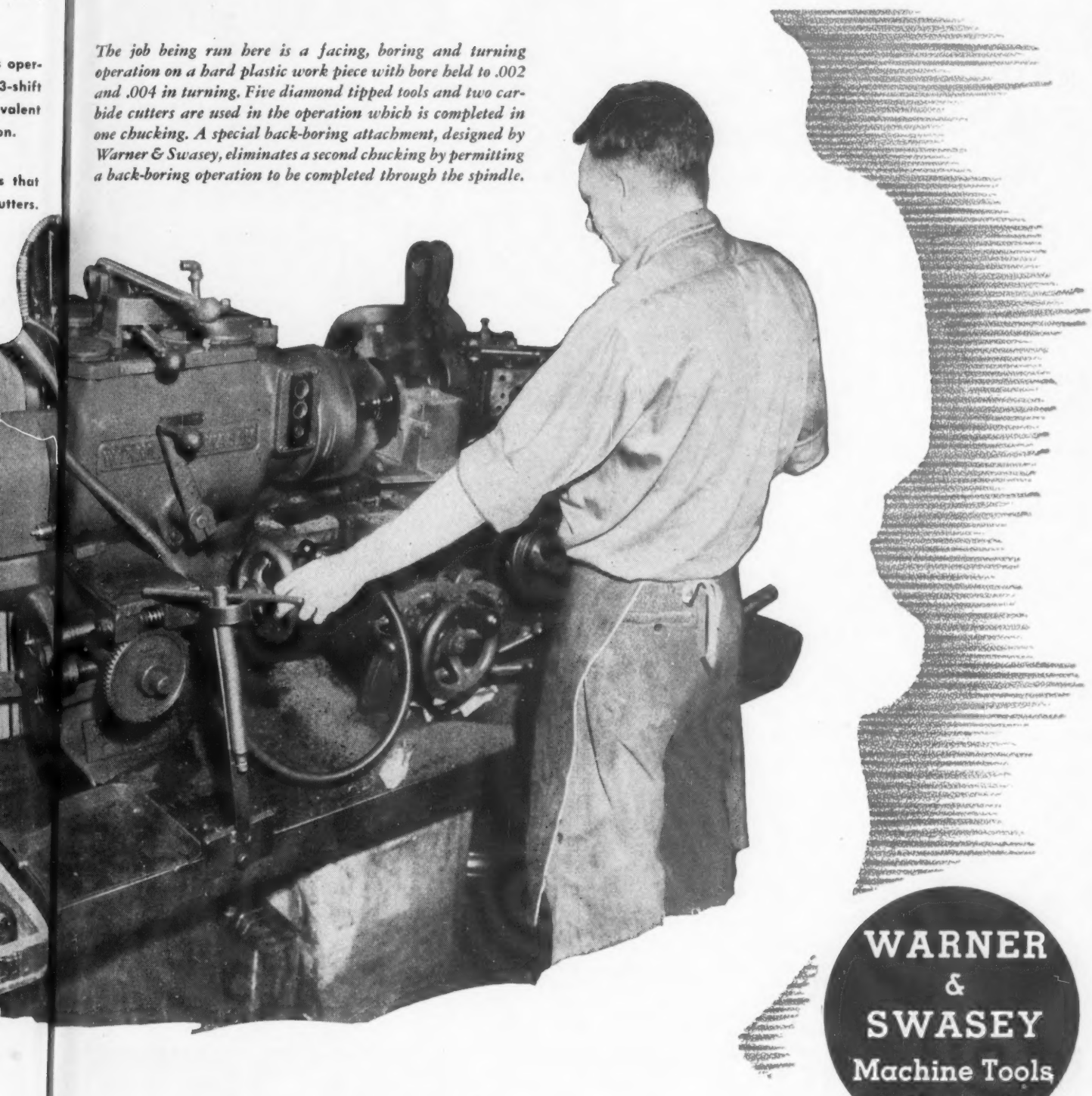
The parts being turned go into machines used by the Industrial Rayon Corporation, Cleveland. They are machined to close limits with the turret lathe operating at 1480 r.p.m. When assembled, these parts run in acid—they are made of hard plastic—metal is impractical. High speed steel cutters dull too quickly, so diamond and carbide cutters are needed.

The lathe bed is piled up with gritty powder. No coolant can be used for flushing. An air hose blast is used after each chucking but plastic dust settles on all parts of the machine. The abrasive action of this fine powder penetrates into all working surfaces and bearing mountings making operating conditions unusually severe.

In the face of this high-speed, severe test, General Industries' costs for repair parts have been only $11.40 during the past 7 years when over 19 years of single-shift operation were put on this machine . . . another example of the accuracy, stamina, and low maintenance costs of Warner & Swasey Turret Lathes.

7 years . . . only $1140

The job being run here is a facing, boring and turning operation on a hard plastic work piece with bore held to .002 and .004 in turning. Five diamond tipped tools and two carbide cutters are used in the operation which is completed in one chucking. A special back-boring attachment, designed by Warner & Swasey, eliminates a second chucking by permitting a back-boring operation to be completed through the spindle.

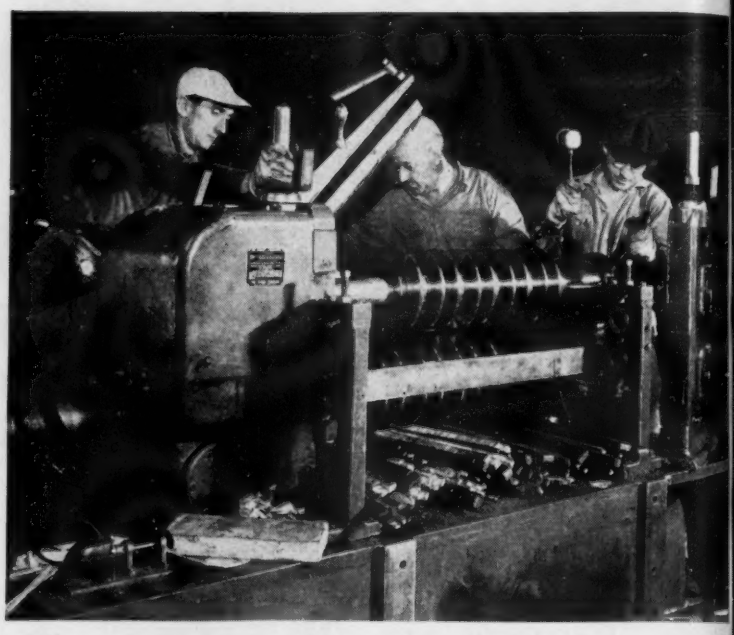


WARNER & SWASEY
Machine Tools
Cleveland

YOU CAN MACHINE IT BETTER, FASTER, FOR LESS . . . WITH A WARNER & SWASEY

This is HIGH SPEED

YODER Slitting Line in Action . . . . . Delivering Many Miles per Day of Widely Varied Stock and Special Sizes from 3/8" up.



With accurately sized spacers, shims and cutters, change of setup on the Yoder slitter is simple and fast. Note that the substantial job being set up here leaves plenty more capacity on the slitter.

When it comes to production slitting of steel for industry you can't beat a combination like this complete Yoder Slitting Line and a smooth working team of operators, at the modern plant of Follansbee Steel Company (Follansbee, West Virginia). If you could see the strips of high-grade stainless whistling from the slitter to the double swivel recoiler, and watch the every-motion-counts way these lads swivel and unload one set of recoils while threading the next set, you would understand what we mean.

Per-pound costs figure out right with this sort of production, and stepped up output helps industry get the steel urgently needed for the manufacturing of goods that will keep us all employed.

Yoder makes a great variety of other special metal working machinery too . . . all designed with the same objective—to cut costs by raising production.

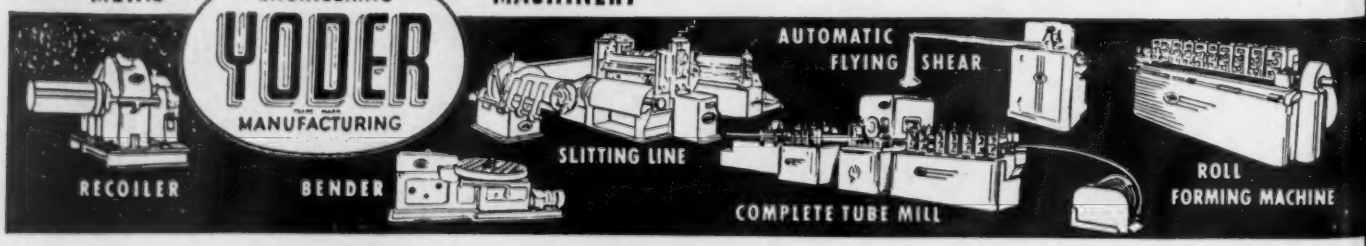
Ask for Bulletin G 451, describing the Yoder Line

METAL • WORKING • PRODUCTION • MACHINERY

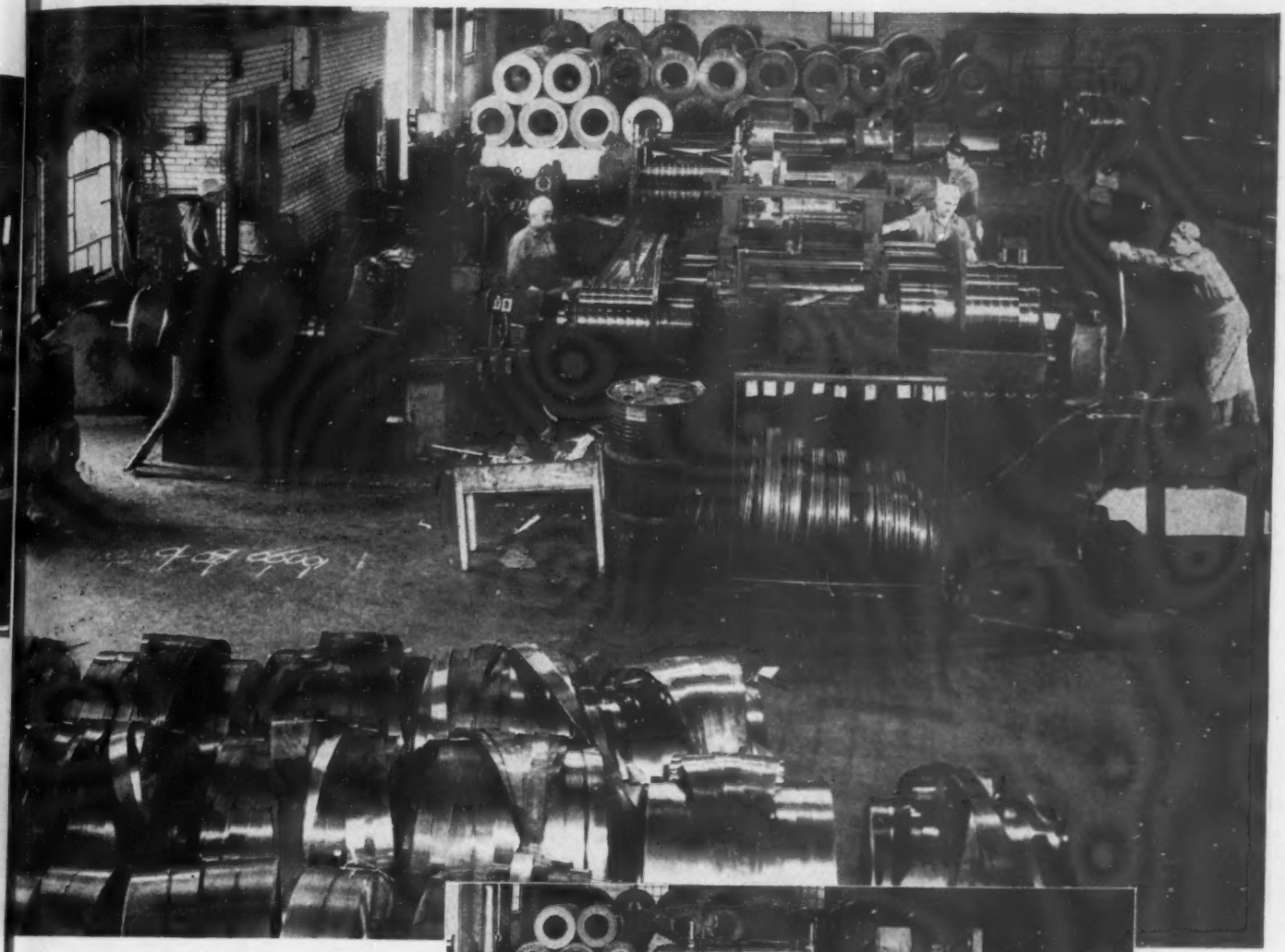
ENGINEERING

YODER

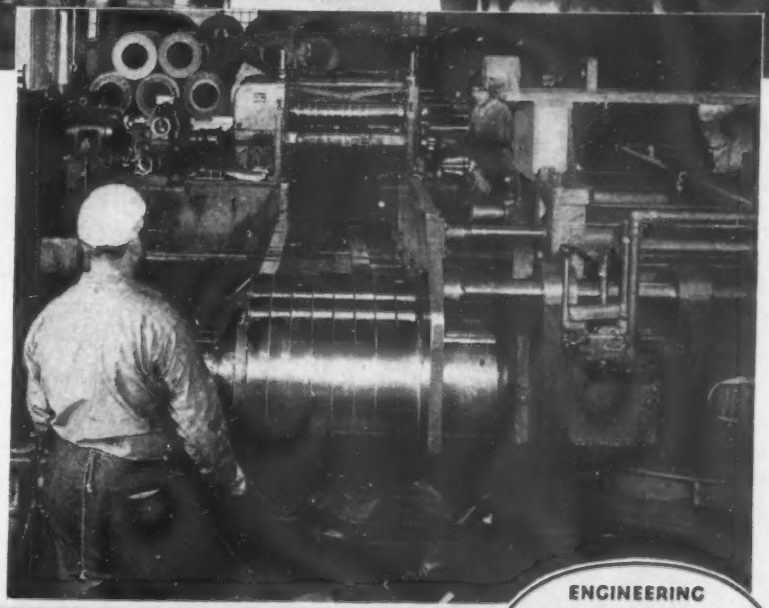
MANUFACTURING



Metal Slitting at its Best



Overall view of the Follansbee ◆ Yoder Installation. A real production layout. Note unloading of eight recoils while eight more are recoiling on the same machine. Coils in background are mill stock; those in foreground finished slit stock.



Straight and uniformly accurate strip is cleanly cut with a minimum of waste on the Yoder slitter, this set of coils is just about to be cut free and unloaded. In less than half a minute strip will be rolling again on the other reel of the double swivel recoiler. ◆

THE YODER COMPANY

ENGINEERING YODER MANUFACTURING

5502 WALWORTH AVE., CLEVELAND 2, OHIO

For Precision Threading at High Production

The LANDMACO THREADING MACHINE

LANDMACO THREADING MACHINE

The LANDMACO Threading Machine equipped with the LANCO Head will give you quality threads at low operating cost.

It can readily be set up to handle all types of threads and it assures smooth-finished well-formed threads of class 3 fit on the toughest alloy steel.

Write for Bulletin H-75

LANDIS MACHINE CO.

WAYNESBORO · PA. · U. S. A.

Need Specialty Steel...*FAST?*

"CALL CRUCIBLE"

Here's How Crucible Warehouse Service can fill your needs—*save you time and money*

ALL OF THE STEEL you get from a Crucible Warehouse is Crucible's own make. This means that every item of high-speed—tool—die—stainless—alloy—machinery—or special purpose steel is backed by the Crucible mills, which guarantees adequate stocks of uniformly top quality in every warehouse.

Convenient and Time-Saving

The recent Harvard study pointed up the need for better control of steel buying as an important factor in control of production costs. Are you taking full advantage of centralized buying? Crucible's full-range warehouse service may make it possible for you to carry a lower steel inventory. Certainly it involves less paper work in checking and accounting—only one handling in the receiving department—requires no additional phone calls or orders to other suppliers.

Service Engineers Available

Crucible's Advisory Service, set up at each warehouse, brings you the services of experienced steel men. Your Crucible representative can give you sound help in selecting the *right* production steel and the *correct* tool or die steel with which to fabricate it. He can advise you on their most efficient use. In addition, mill metallurgists are available for consultation on special problems.

Crucible's Warehouses handle only Crucible steels ... and the men who make Crucible steels know what each type is best for. Call on your nearest warehouse for expert advice.

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CRUCIBLE STEEL COMPANY of America

Full-Range Service

High Speed · Tool · Stainless · Alloy · Machinery Special Purpose Steels

CHRYSLER BUILDING · 405 LEXINGTON AVE. · NEW YORK 17, N. Y.

Still looking into the Future

YESTERDAY... Punch, snip or melt ... a grueling grind for the cutting of Stainless Steels

Yesterday cutting stainless steel by melting-away or shearing was slow...costly...and with the carbon arc the resulting surfaces were rough and unsightly.

TODAY... It's the oxyacetylene flame for production cutting of Stainless Steels

Today, Airco's new Flux-Injection Method of stainless steel cutting is time-saving and economical. With this new process, stainless steels with alloying elements as high as 50% can be oxyacetylene flame cut as readily as ordinary steels. Used with Airco oxyacetylene equipment, this new method keynotes simplicity and economy. In fact, operating conditions and instructions for stainless steel cutting approximate those for mild steel, and "cut speed" is comparable.

AND TOMORROW...?

Airco's research and development staff will continue to work in this and other fields of metal working to contribute new and better oxyacetylene flame methods.. creating the techniques and tools of tomorrow. Moreover, the facilities of our Technical Sales Division are available to all metal working men in applying Airco processes to the solution of their problems.

For more information about stainless steel cutting, write for a copy of "Flux-Injection Method Brings Economies of Oxyacetylene Flame Cutting to Stainless Steel". Address your nearest Airco office, or write: Air Reduction, General Offices, 60 East 42nd Street, New York 17, N. Y. In Texas: Magnolia Airco Gas Products Company, General Offices, Houston 1, Texas.

AIRCO **AIR REDUCTION**

Offices in All Principal Cities

ORIGINATORS OF MODERN OXYACETYLENE METHODS FOR THE METAL WORKING INDUSTRY

Scovill NON-FERROUS FORGINGS

When SCOVILL becomes your METAL-PARTner . . .

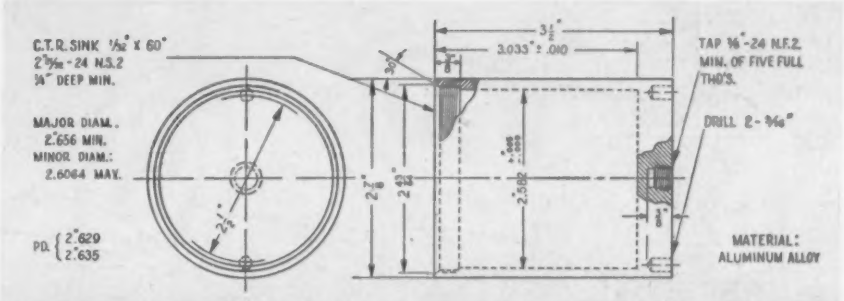
PRECISION FORGINGS LIKE THESE MAY REPLACE COSTLY ASSEMBLIES

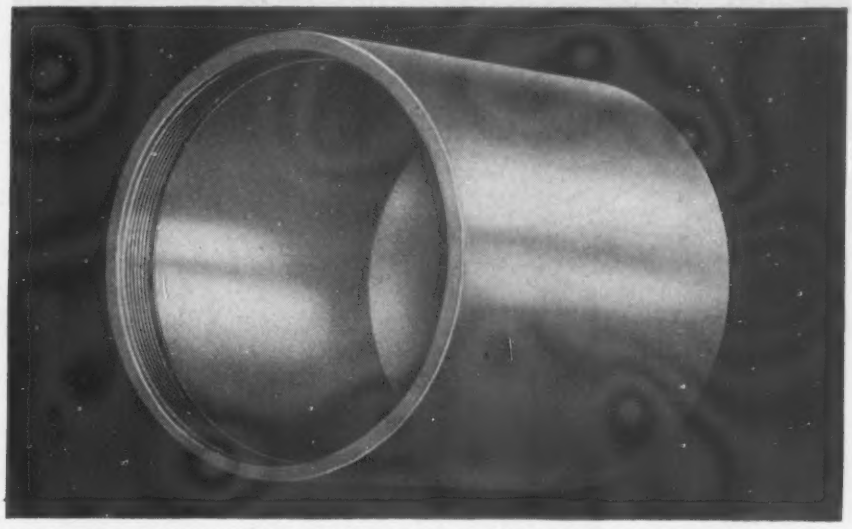
Because the bottom is so much heavier than the sidewall, this aluminum alloy geophone case was originally made as a two-piece assembly. Now Scovill forges the inside and outside to finished dimensions, facing the bottom to a square corner, and countersinking and tapping the open end. Three holes are drilled in the bottom, the large center hole being also tapped . . . Typical of Scovill's observance of close tolerances in forging, this instrument part is a more satisfactory, less expensive job than the assembly it replaced.

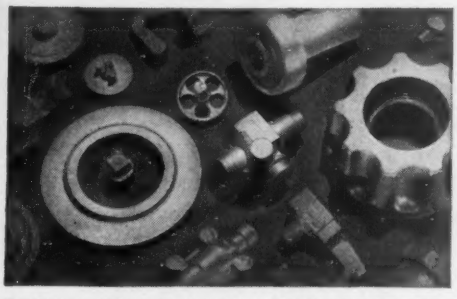
SCOVILL *Masters of Metal*

LET SCOVILL HELP

Have you considered that your production of brass, aluminum or other non-ferrous parts may be greatly benefited by a change in methods or design? Many manufacturers have found our broad experience in non-ferrous forging a worthwhile aid in raising quality or lowering costs. Let's talk over how *you* may profit by making Scovill *your* METAL-PART*ner*. Fill in the coupon and mail today. Scovill Manufacturing Company, Waterbury 91, Conn. *Export Department:* 405 Lexington Avenue, New York 17, N. Y.







Please send me information about your metal-working facilities. I am interested in non-ferrous forgings for the applications checked:

- ☐ Aircraft
- ☐ Automobiles
- ☐ Band Instruments
- ☐ Blow Torches
- ☐ Cameras
- ☐ Communication Equipment
- ☐ Cylinder Valves
- ☐ Fire Extinguishers
- ☐ Household Appliances
- ☐ Industrial Instruments
- ☐ Plumbing Goods
- ☐ Pumps
- ☐ Valves
- ☐ Welding Equipment

Other applications.....

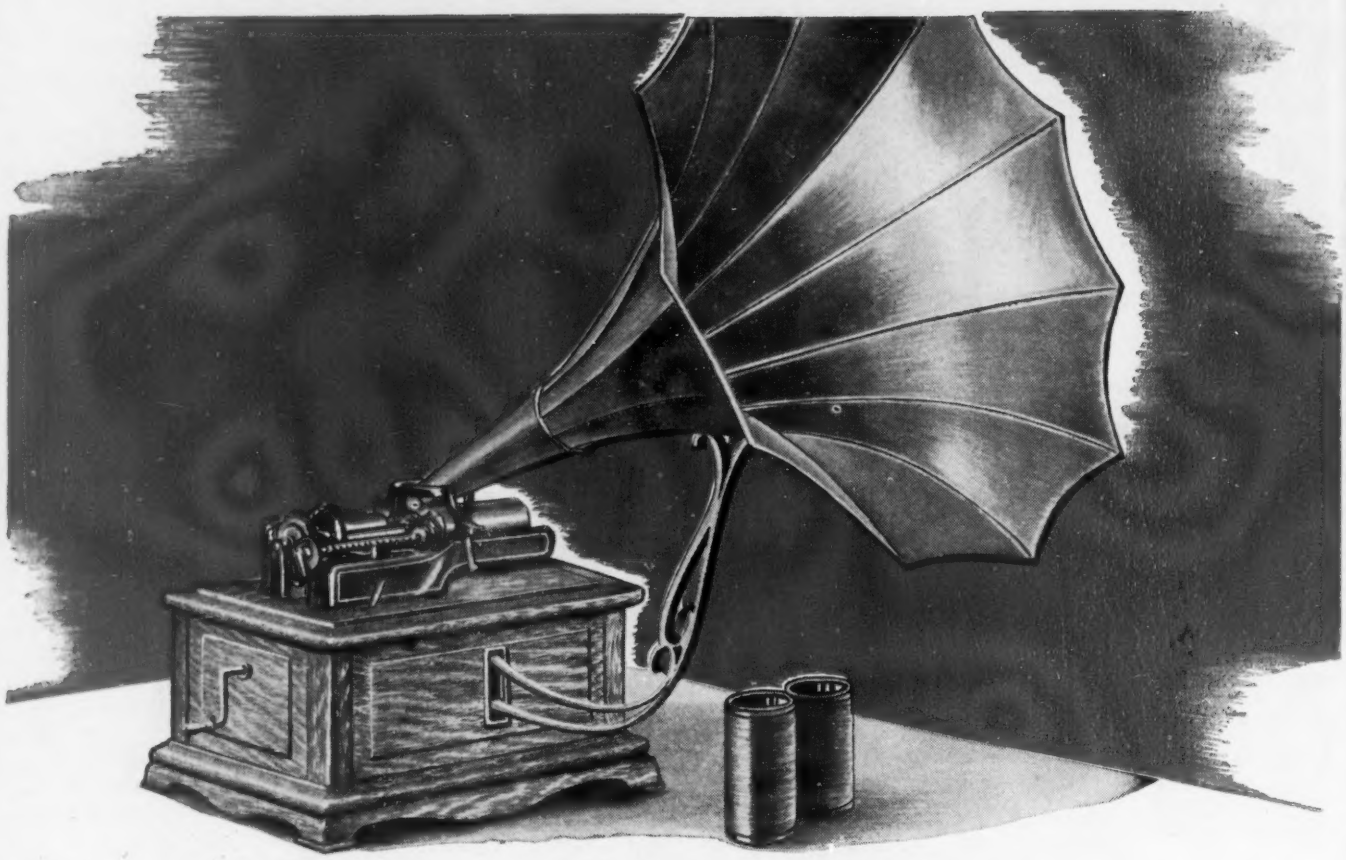
.....

SCOVILL MANUFACTURING COMPANY
Forgings Division
20 Mill Street
Waterbury 91, Connecticut

Name .....

Company .....

Address .....



THIS TALKING MACHINE

Can't play a Modern Production Tune

Sure, it was a good machine in its day: good design, good materials, good workmanship. But you'll admit there have been some developments and refinements in later models that give them an "edge" in today's markets. How about examining your manufacturing operations . . . your production "machine" . . . on the same basis?

For example, there may be certain parts now being produced by conventional methods which could be turned out at less cost, in less time, by using ArmaSteel. This versatile metal, available in a wide range of physical properties, reduces machining requirements through the inherent economy of castings, and provides up to 30% better machinability.

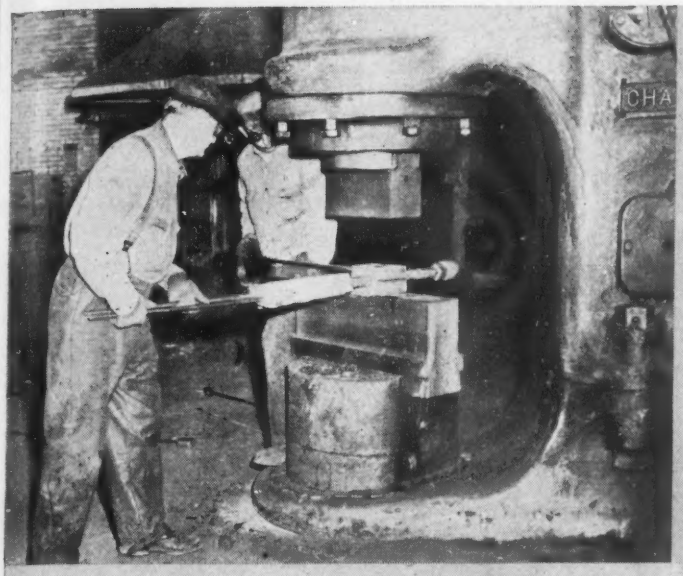
ArmaSteel has replaced forgings and bar stock in scores of applications. It may well hold the answer to lower parts-costs in some phases of your production.

SAGINAW MALLEABLE IRON DIVISION, GENERAL MOTORS CORPORATION, SAGINAW, MICHIGAN

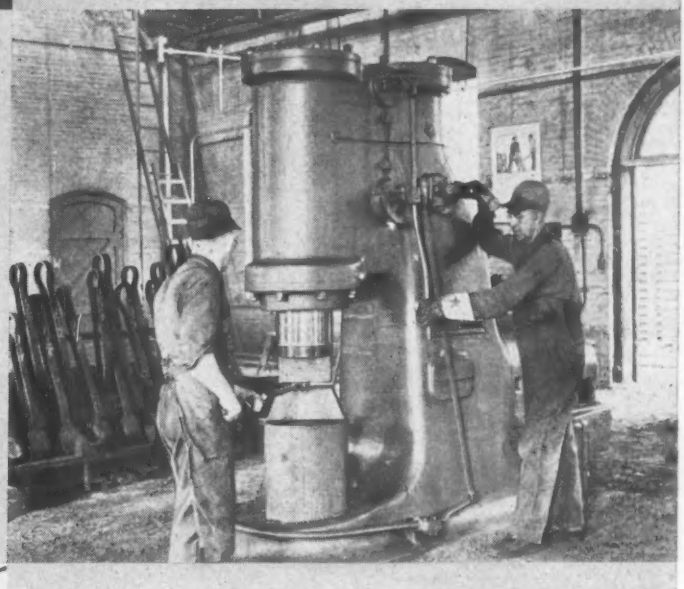
CAST FOR A LEADING ROLE IN INDUSTRY

ArmaSteel*

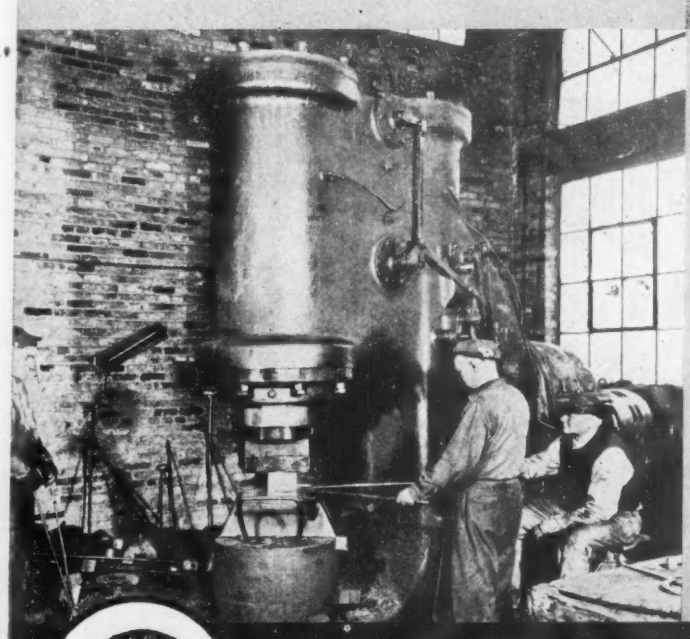
*Reg. U.S. Pat. Off.



A Forging Department right in your own plant . . . . . without steam or air lines . . . . . .



The Chambersburg Pneumatic Hammer can be located anywhere without respect to steam lines, air lines, shafting or belting. It carries its own source of power — its motor-driven compressor. There is no load on steam boiler or air compressor — yet, wherever electricity is available, it is ready for work instantly.

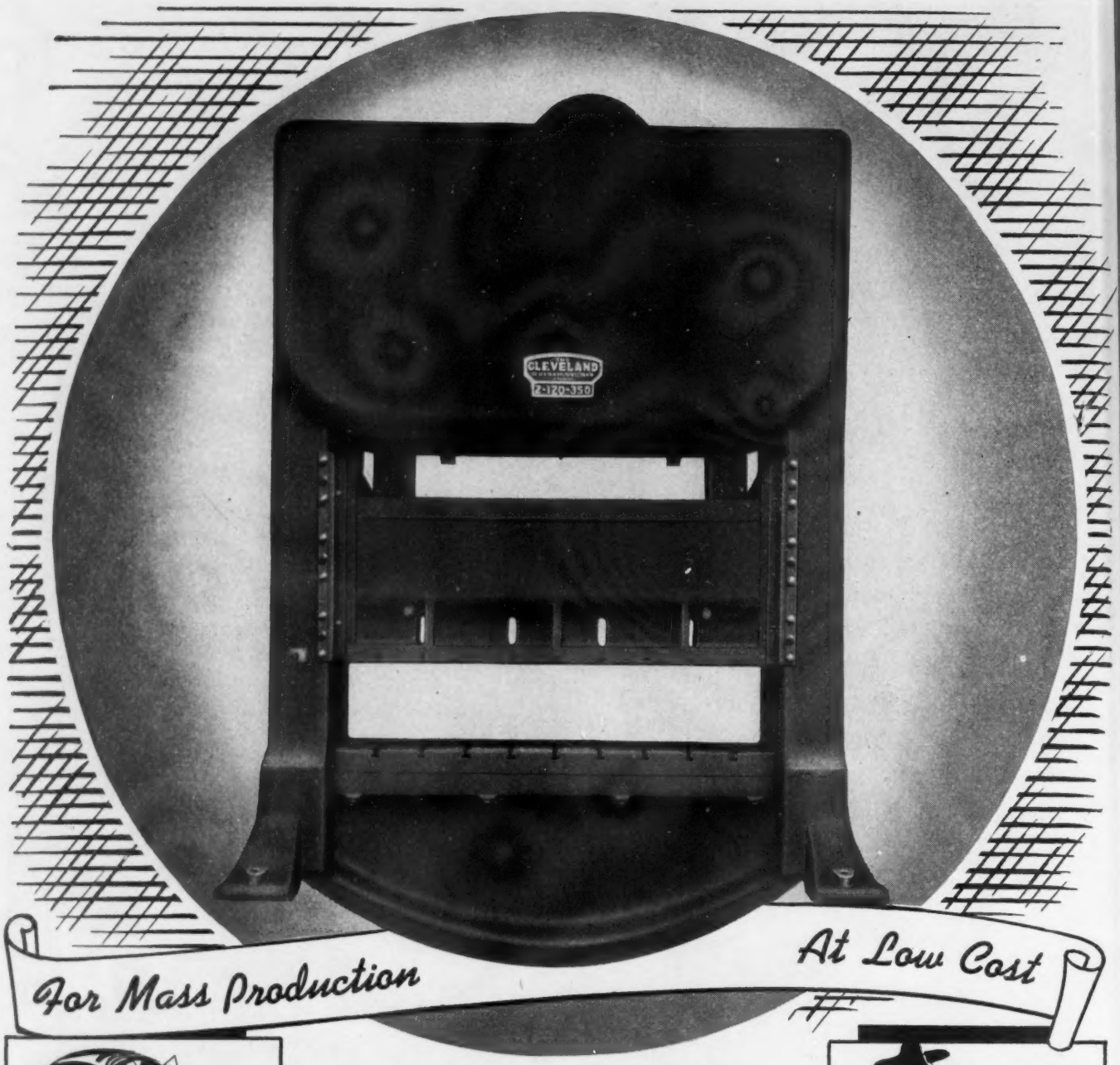


A wide range of sizes — 200 lbs. to 5000 lbs. — makes this unit ideal for practically any forging requirement, from tool room use in forging and dressing tools, in foundry work, as in straightening reinforcing rods, etc., to large forgings for maintenance or production. Write for Bulletin 1275.

CHAMBERSBURG ENGINEERING COMPANY Chambersburg, Pa.

CHAMBERSBURG

HAMMERS · CECOSTAMPS · PRESSES



For Mass Production *At Low Cost*

MODERN
CLEVELAND PRESSES

AUTOMOBILES

STOVES

WASHING MACHINES

AIRPLANES

REFRIGERATORS

OFFICE EQUIPMENT

Single Point, Two Point and Four Point are built to conform to modern engineering standards of design and construction, and embody greater strength and ruggedness with greatly reduced weight.

Furthermore, modern design permits of many improvements in operating efficiency . . . . gears completely enclosed, running in a bath of oil . . . . short shafts eliminate undue torsional strain . . . . sensitive and safe, air and hydraulically operated clutches, electrically controlled . . . . slides counterbalanced by air . . . . these, and many more recent developments contribute not only to continuous operation but also to a better and more uniform product.

Manufacturers who are expanding or replacing their Power Press equipment will find it advantageous to install Modern Cleveland Presses because Cleveland Presses embody all the features which assure long life, dependability, accuracy and profitable production.

THE CLEVELAND PUNCH & SHEAR WORKS COMPANY *Cleveland, O.*

New York · Chicago · Detroit · Philadelphia · Pittsburgh

Bronze bushings of two types, cast centrifugally and precision-finished by Shenango-Penn. These and other shapes, many far more complex, are regularly produced here for reasons outlined below.

IT'S A BETTER PLAN.. if Shenango-Penn Centrifugally Cast Parts are in it!

HERE'S WHY! Parts cast centrifugally by Shenango-Penn, and machined by us too, if you wish, are inherently much stronger and tougher, have finer, more uniform grain structure than ordinary cast parts of the same analysis. Centrifugal pressure gives the metal greater density, raises Brinell hardness 2 to 5 points, increases tensile strength by 8 to 20 per cent. At the same time, the Shenango-Penn process prevents sand inclusions, blow holes, porosity.

Those are a few of the reasons why more and more builders of machinery and equipment are turning to Shenango-Penn for all castings and parts that are essentially symmetrical in shape. It's a flexible process, not by any means limited to parts of simple circular section. Many variations are possible including flanges, bosses, lugs and other projections.

Yes, any product plan that includes Shenango-Penn castings instead of ordinary ones is indeed a *better* plan. It always means a more durable product, better able to withstand pressure, friction, abrasion, corrosion and all kinds of stresses. It also means lower production cost. Don't you think it's worth looking into?

Bulletin No. 143 gives full information on Shenango-Penn centrifugal castings including specifications and analyses of the various alloys available, and also tells about our modern machining facilities for those users who desire semi-machined or finished parts. Send for this free bulletin.

SHENANGO-PENN

SHENANGO-PENN MOLD COMPANY

463 West Third Street • Dover, Ohio

***Executive Offices:* Pittsburgh, Pa.**

ALL BRONZES • MONEL METAL • ALLOY IRONS

MAN !!! WHAT A WONDERFUL DREAM

about deliveries these days!

But There Is a Dream That

SPEED CASE x1515

Can Make Come True, and That Is Your Dream of INCREASED PRODUCTION

There's no other steel just like SPEED CASE so, naturally, we're swamped. Orders and inquiries are making our faces red. We're filling orders just as rapidly as the gods of supply and production will let us, and as to inquiries—well,

here's our offer...

We have a Speed Case Production expert who, after samples are sent you, will be delighted to visit your plant and show you how to set up your tools to INCREASE PRODUCTION 30 to 100% and still improve the quality of your product.

... IT'S WORTH WAITING FOR

Tear this off ... ATTACH TO YOUR LETTERHEAD AND MAIL TO EITHER COMPANY BELOW

ACTUAL PHOTOGRAPH

Speed Case (.20 carbon) 1 inch cold drawn bar tied in a knot, without fracture.

Licensor

MONARCH STEEL COMPANY

HAMMOND · INDIANAPOLIS · CHICAGO

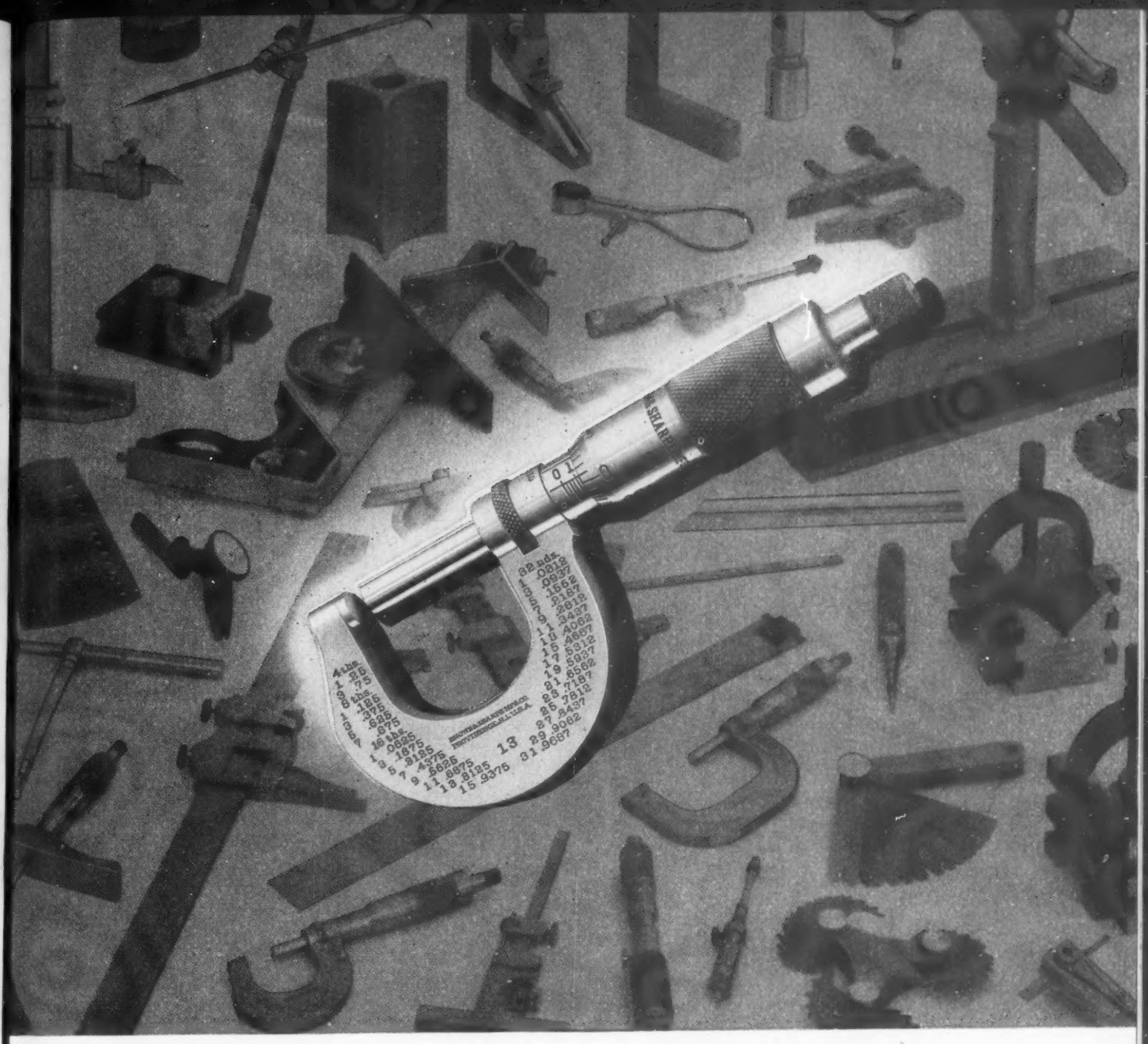
PECKOVER'S LTD., Toronto, Canadian Distributor

MANUFACTURERS OF A COMPLETE LINE OF COLD FINISHED CARBON AND ALLOY STEEL BARS

Licensee for Eastern States

THE FITZSIMONS COMPANY

YOUNGSTOWN, OHIO



Tools that give you "full measure"

All a skilled machinist can possibly ask of precision tools, Brown & Sharpe tools provide in fullest measure . . . accuracy, reliability, sound design and fine finish.

Typical of this full measure of desirable characteristics are Brown & Sharpe Micrometers, known the world over for such worthwhile qualities as: wear-resisting measuring surfaces . . . fine precision screw and spindle . . . adjustable thimble, providing simple, dependable adjustment . . . clear, easily read graduations and figures.

Nothing less than this full measure of Brown & Sharpe skill, knowledge and manufacturing integrity can give your customers maximum return on their investment in fine machinists' tools.

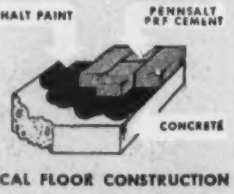
BROWN & SHARPE MFG. CO.,
Providence 1, R. I., U. S. A.

We urge buying through the Distributor B·S

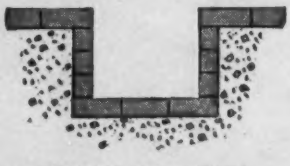
BROWN & SHARPE TOOLS

A NEW AND SUPERIOR RESIN-TYPE CEMENT...
PENNSALT
PRF CEMENT
Designed specifically for bonding corrosion-proof brick and tile in uses where acids, alkalis and solvents are encountered

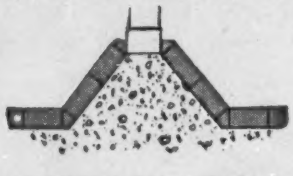
Typical applications are laying floors and drains, and lining tanks in metal finishing shops where a special cement is required that will resist corrosive acids, alkalis and solvents.



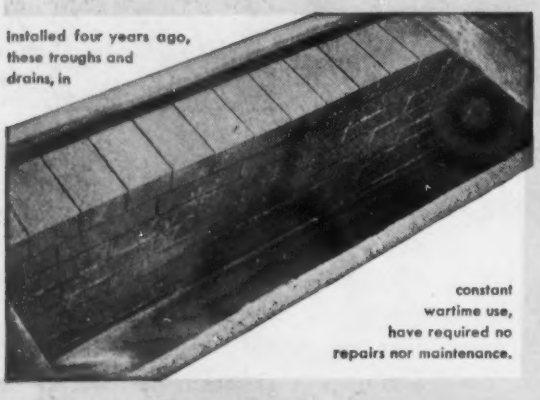
TYPICAL FLOOR CONSTRUCTION



DRAIN OR TANK LINING



PROTECTION FOR SUPPORTS



Installed four years ago, these troughs and drains, in constant wartime use, have required no repairs nor maintenance.

PROPERTIES

Chemical Resistance — Inert to: Alkalis, fats, oils, solvents, fresh or salt water, steam, all mineral acids including hydrofluoric acid, with exception of high concentrations of strong oxidizing acids such as nitric, chromic and many organic acids, and alternate contact with strong acid and alkali.

Attacked by strong oxidizing agents.

Color	Black
Permissible temp. in use	Up to 375° F.
Absorption (ASTM)	Less than 0.5%
Compressive strength	12,000-14,000 lbs. per sq. in.
Tensile strength	1,000-2,000 lbs. per sq. in.
Modulus of rupture	1,800-2,100 lbs. sq. in.
Coefficient of thermal expansion	.0000087 inches/inch/degree F. (In range 80-350° F.)
Porosity	Completely impermeable, even at elevated temperatures. It is non-porous.
Joint thickness recommended	⅛-¼ inch
Mortar required to butter one 9 inch brick on 3 sides	½ lb. (approximately)
Storage	Can be stored indefinitely in a cool place.
Hardening time	Pennsalt PRF Cement construction may be placed in service within twenty-four hours.

Containers (Non-returnable)	POWDER	SOLUTION
	20 lb. drum	10 lb. drum
	100 " "	50 " "
	250 " "	375 " "

SPECIAL CHEMICALS DIVISION PRODUCTS

Acid, Alkali, and Solvent proof cements—Acid, Alkali, and Solvent Emulsion Type Cleaners—Paint Strippers—Pickling Agents—Rust Inhibiter.

SPECIAL CHEMICALS DIVISION
PENNSYLVANIA SALT MANUFACTURING COMPANY
Dept. S-10, 1000 Widener Building, Philadelphia 7, Pa.

I would like to have you send me free booklet on Pennsalt PRF Cement.

NAME_____

TITLE_____

COMPANY_____

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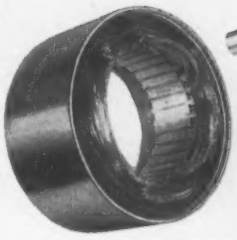
Special Chemicals Division
PENNSYLVANIA SALT
MANUFACTURING COMPANY
Chemicals
1000 Widener Building, Philadelphia 7, Pa.
NEW YORK • CHICAGO • ST. LOUIS • PITTSBURGH • CINCINNATI • MINNEAPOLIS • WYANDOTTE • TACOMA

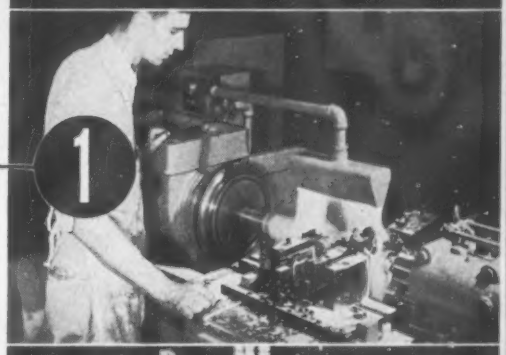
How to improve machining methods for ELECTRIC MOTOR PARTS with . .

Sundstrand "ENGINEERED" Production

Here's an interesting example of Sundstrand "Engineered" Production as applied to the manufacturing of electric motors. These motor components vary in size and operations required. Each is machined on Sundstrand equipment with a method best suited to the production requirements of the plant in which the machines are installed. If you manufacture electric motors of any type, our engineers have had practical experience which may prove helpful in improving your machining methods. Call on them without obligation.



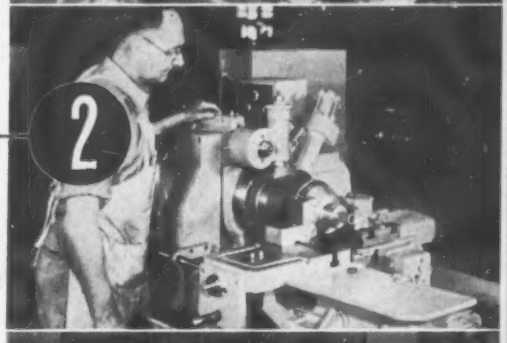
THREE TYPICAL OPERATION



1 • TURNING SHAFTS

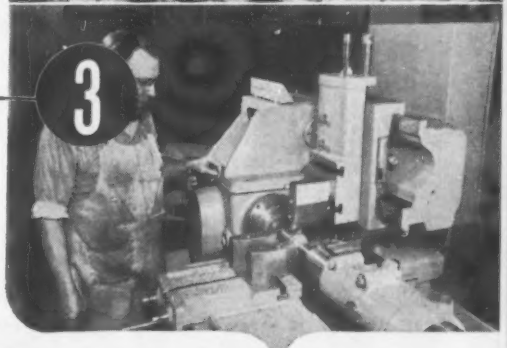
Rough and finish multiple tool turning both ends of motor shafts in four operations. Shafts come cut to length and centered. Sundstrand automatic lathes completely turn twelve different sizes of motor shafts. Carbide tools, multiple tooling and automatic cycling increase production over the single tool lathes previously used for this work. Operator's only duties are to load and unload parts and start the automatic machine cycle.

Illustration is of tooling setup for rough turning operation on one end.



2 • TURNING RABBET FITS

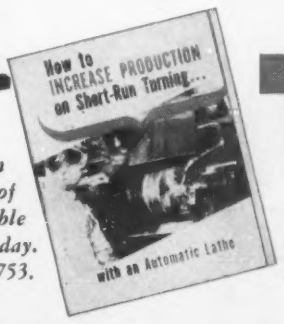
This standard Sundstrand automatic lathe bores the inside diameter of both ends, chamfers the inside diameter and outside diameter of both ends and faces the ends of a stator frame and coil assembly. Eight tools are used to complete the operation in one machine cycle. Machine and tool adjustments enable this equipment to be used on a number of different sizes of parts.



3 • TURNING, FACING & SHAVING ARMATURE ASSEMBLIES

This Sundstrand is equipped with four tool slides . . . two front, one rear and one overhead. Operator's duties consist only of loading, unloading part and starting machine cycle. The tool slides automatically rapid approach, feed, rapid return and stop. The four T. C. tipped tools turn the laminations, face off the end of the windings and shave. Several different sizes of parts are handled on this machine.

free



This booklet contains useful turning information on a wide variety of parts and materials. A study of these modern tooling methods may reveal profitable methods for you. Write for your copy today. Ask for bulletin No. 753.

SUNDSTRAND MACHINE TOOL CO. ROCKFORD, ILLINOIS, U.S.A.

SUNDSTRAND
MACHINE TOOL COMPANY
2540 Eleventh Street, Rockford, Illinois, U. S. A.

RIGIDMILLS • AUTOMATIC LATHES • SPECIAL MILLING AND TURNING MACHINES

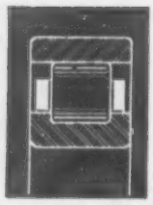
BEARING FACTS NO. 1

The Cylindrical Roller Bearing

AS PRODUCED BY NORMA-HOFFMANN

USE THIS BEARING WHERE NO OTHER ANTI-FRICTION BEARING WILL STAND UP:

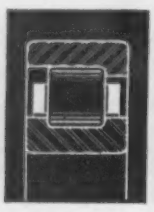
- HIGH SPEEDS
- PLUS HEAVY LOADS
- PLUS TEMPORARY OVERLOADS
- PLUS SHOCK
- PLUS VIBRATION



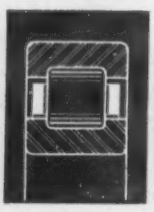
"R" Type: For heavy radial load and axial float. Straight outer ring, two-lipped inner ring.

FIVE STANDARD TYPES of cylindrical roller bearings are shown in cross-section below. Other variations of this type are also available. Metric and inch sizes up to 22½" bore.

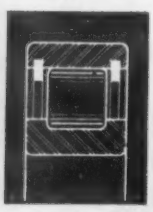
"R-E" Type: For heavy radial load and axial float. Two-lipped outer ring, straight inner ring.



"R-L" Type: For heavy radial load and one-direction axial location. One-lipped outer ring, two-lipped inner ring.



"R-LL" Type: For heavy radial load and two-direction axial location. Two-lipped outer ring, two-lipped inner ring.



"R-RR" Type: For heavy radial load. Full-roller retainerless type with snap rings.

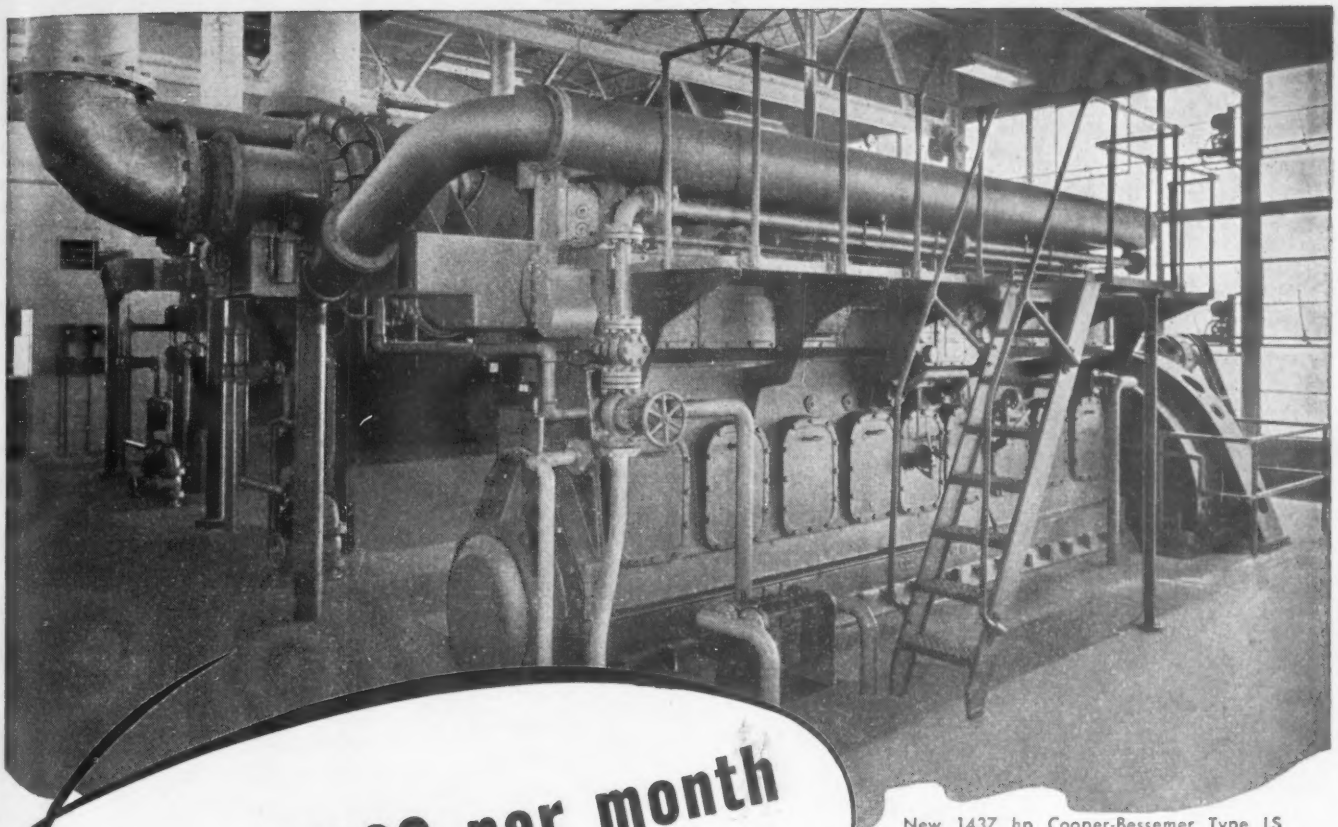
NORMA-HOFFMANN PRECISION ROLLER BEARINGS GUARANTEE YOU:

- LARGER SHOCK-ABSORBING CAPACITY THAN ANY OTHER TYPE SINGLE-ROW BEARINGS.
- MARGIN FOR 50% OVERLOADS.
- LOWER FRICTION COEFFICIENT UNDER HEAVY LOAD THAN ANY OTHER TYPE BEARING.
- SPEEDABILITY EQUAL TO ANY BALL BEARING, SIZE FOR SIZE, UP TO 35,000 R.P.M.
- 100% MACHINED, EXTRUDED BRONZE CAGE OF MAXIMUM DENSITY AND UNIFORMITY.

"NORMA-HOFFMANN"

PRECISION BALL, ROLLER AND THRUST BEARINGS

NORMA-HOFFMANN BEARINGS CORPORATION
STAMFORD, CONNECTICUT
FIELD OFFICES: New York, Chicago, Cleveland, Detroit, Pittsburgh, Cincinnati, Los Angeles, San Francisco, Portland, Ore., Seattle, Phoenix



Saves $100 per month in fuel alone!

New 1437 hp Cooper-Bessemer Type LS 8-cylinder supercharged Diesel recently installed in Portland, Michigan plant of Tri Counties Electric Cooperative. Plant's original atmospheric engines, also Cooper-Bessemers, are visible in background. New engine relieved tight load situation and permitted overhaul of the older units, their first in 22,000 hours.

For a single engine to save 100 dollars per month in fuel cost is nothing to be sneezed at in anybody's power plant. This is the comparative saving now afforded by a Cooper-Bessemer supercharged Diesel recently installed in the Portland, Michigan plant of the Tri Counties Electric Cooperative.

This well-managed plant has two other Diesels . . . five-year-old Cooper-Bessemer Type JS's. Through years of gruelling wartime service, despite frequent 10 to 25% overloads, these engines have given the kind of trouble-free service that leads users to re-specify Cooper-Bessemers whenever additional capacity is needed.

Supercharged, the new Diesel not only brings fuel economy impossible with any atmospheric engine, but it has a capacity equal to both the original engines with only a negligible increase in length.

Whatever your engine requirements may be, 100 to 2000 horsepower, supercharged or atmospheric, there is a modern Cooper-Bessemer that will give you engine performance at its best.

The
Cooper-Bessemer
Corporation

MOUNT VERNON, OHIO — GROVE CITY, PENNA.

New York Washington Tulsa
Dallas St. Louis Houston Los Angeles Seattle Shreveport

NEW TL-20 WILL PICK IT UP AND PUT IT DOWN *at a Saving*

Put *skilled labor*, in the form of a new Lorain TL-20 Crane, on your material handling jobs and still enjoy important time and labor saving! This unit can thread its way speedily to all parts of the yard, handle every type of work from hook block and magnet, to clam-shell and dragline. Night only means turning on its lights (standard equipment) but no slackening in its pace.

The new TL-20 is a dependable, rugged "one man gang," always ready to hurry materials to hungry production lines and speed finished products to waiting customers. Ask your local Thew-Lorain distributor for complete details on the TL-20 — something really *new* in the ½ yd. class.

THE THEW SHOVEL COMPANY
LORAIN, OHIO

Thew TL-20 Lorain FEATURES

- Unit Assembly
- Interchangeable Parts
- 5 Identical Clutches
- Anti-Friction Bearings
- 2-Speed Crawler
- "Full Circle" Steering
- 9 Rubber-Tire Mountings
- All-Purpose Crane Boom

Troubled with Balky Arc Furnace Electrodes?

Fast-Acting, Accurate "Regulex" Control Eliminates Six Furnace "Bugs" Due to Faulty Electrode Action

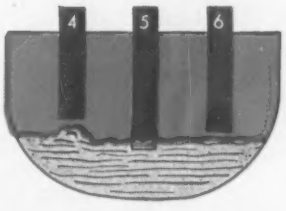
MELTDOWN PERIOD

1. **REPEATED ARC INTERRUPTION,** due to sudden "settling" of metal. Sensitive "Regulex" generators continually adjust electrode position to meet rapidly changing furnace conditions—thus reduce number of arc restrikes required.

2. **INSTABILITY OF ARC,** due to inaccuracy of control for raising an electrode when a short circuit occurs. "Regulex" variable voltage control raises electrodes *just the right amount*—keeps arc values constant and increases furnace output per kilowatt-hour input.

3. **BREAKAGE OF ELECTRODES,** caused by caving in of metal charge against electrodes. Fast-acting "Regulex" control pulls electrodes safely out of a cave-in. "Regulex" generators also limit mechanical shock to electrodes, by reducing time required to strike a steady arc.

REFINING PERIOD



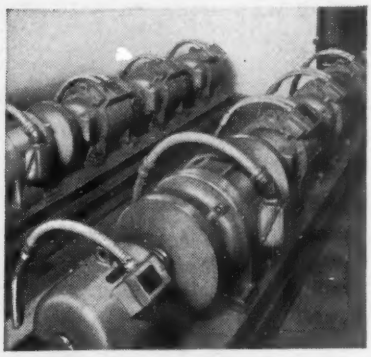
4. **WASTE OF POWER,** as a result of current surges when metal boils up against electrodes. "Regulex" variable voltage control chops off current peaks . . . lower total power input results.

5. **FREEZING OF ELECTRODES** in molten bath, due to electrode "drift" when a-c power fails. Only the "Regulex" generator set is provided with a flywheel for automatically raising electrodes upon a power failure...prevents electrode breakage.

6. **BURNING OF ELECTRODES** during refining period, due to using too short an arc. Accurate "Regulex" control permits use of longer arc—saves electrodes.

Your arc furnace manufacturer will be glad to tell you about "Regulex" furnace control. Or write directly to ALLIS-CHALMERS, MILWAUKEE 1, WIS.

Save Money with "Regulex" Arc Furnace Control!



EXTRA MELTS
"Regulex" variable voltage control means accurate and rapid adjustments in electrode position. Result is that a stable arc is struck in less time. Often, one or more additional furnace melts are obtained per day.

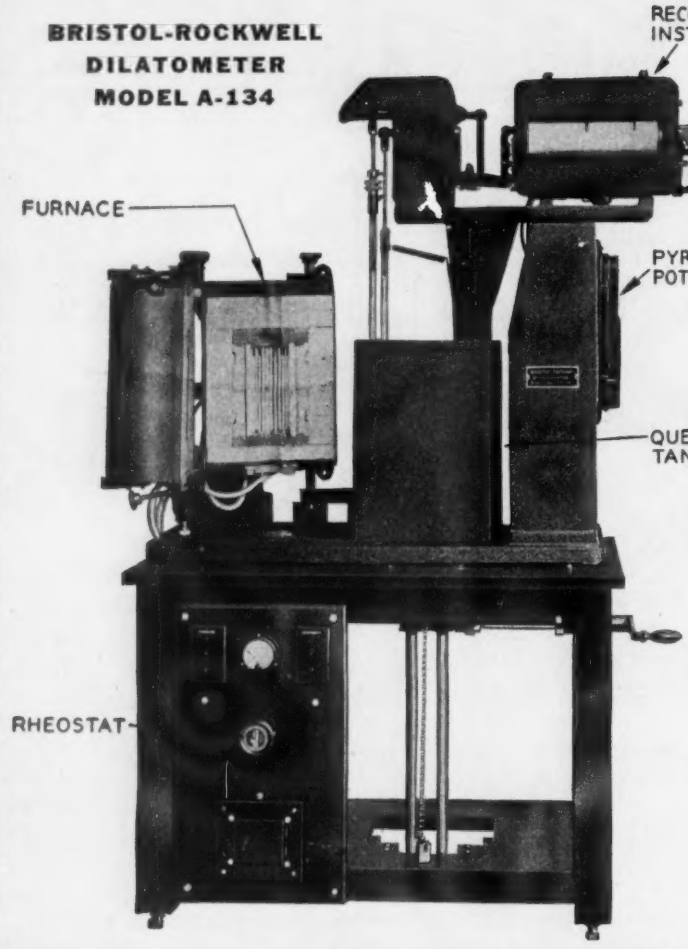
LESS POWER WASTE
"Regulex" generators, with their instant response to changing furnace conditions, help eliminate wasteful current peaks . . . give you maximum arc furnace output with minimum kilowatt-hour input.

LONGER ELECTRODE LIFE
Fewer arc restrikes, less danger from cave-ins, plus the flywheel feature of the "Regulex" set which prevents "freezing" of electrodes—all these factors add to the life expectancy of your furnace electrodes!

Allis-Chalmers

MILWAUKEE 1, WIS.

A 1940



HOW METAL ACTS *when* HEATED AND COOLED

...Charted on Paper

You can get four important types of information about temperature effects on metal—easily and accurately—from the improved model of the Bristol-Rockwell Dilatometer:

- **Critical points of carbon steel**
- **Coefficients of expansion**
- **Composition (from thermal curves)**
- **Heating rates and heat saturation**

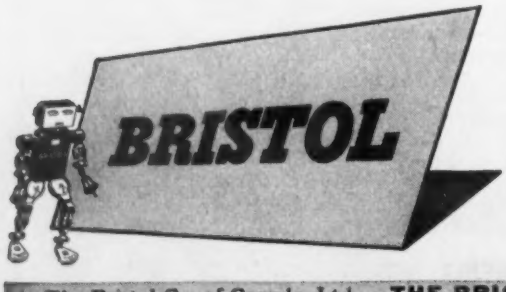
Temperature-dilatation and temperature-time changes are recorded simultaneously during heating and cooling cycles.

The built-in electrical furnace (rheostat-controlled) heats to 2500°F. It takes samples up to 5″ x 1⅝″ (best sample sizes: 2½″ to 3½″ long). Ferrous and non-ferrous metals can be tested.

Quenching Tank

An added feature is the quenching tank which can be raised to the quench position without moving the sample or interfering with the dilatation measuring system.

For full information send for Bulletin No. W1803



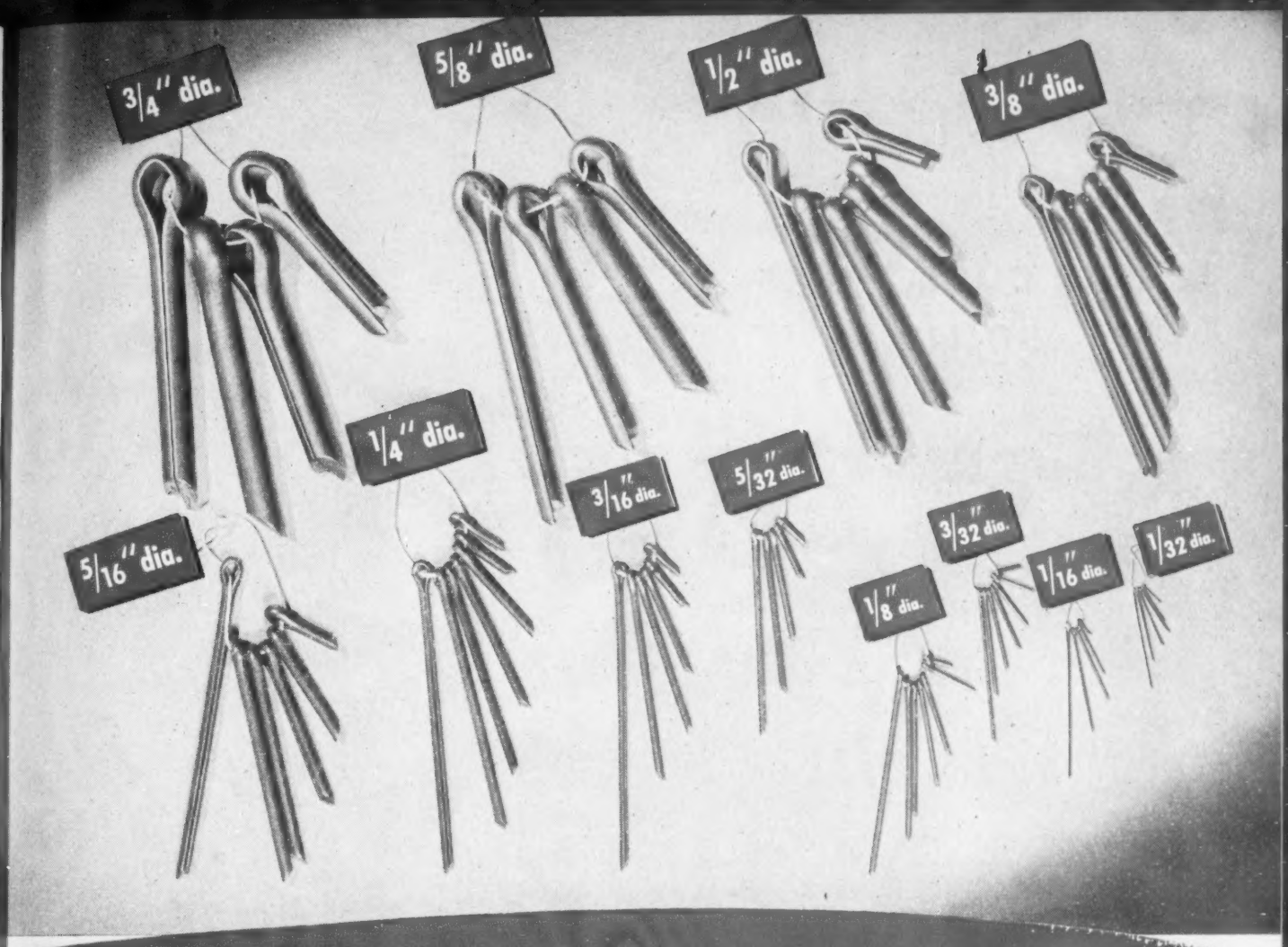
...Gives YOU the Most from Heat

AUTOMATIC CONTROLLING AND RECORDING INSTRUMENTS

The Bristol Co. of Canada, Ltd.
Toronto, Ontario

THE BRISTOL COMPANY, 149 Bristol Road
WATERBURY 91, CONN.

Bristol's Instrument Co., Ltd.
London, N.W. 10, England



OTTERS . . FROM 1/32" x 1/4" TO 3/4" x 24"

along with your bolts and nuts

Our customers find it convenient to obtain bolts, nuts and cotters from the same source —in one shipment and on one bill of lading.

In addition to a full line of steel and brass cotters, Lamson & Sessions produces cotters made of bronze, stainless steel and aluminum alloys, made to your specifications *in production quantities.* Our extraordinary volume production of cotters is maintained by a large battery of machines designed and built exclusively for Lamson & Sessions.

The wire for Lamson cotters is cold rolled in our own plants, insuring control of both size and quality from raw material to finished product. Modern chemical, metallurgical and physical testing laboratories are maintained to insure uniformity of specifications in both standard cotters and those made "special".

The Lamson "Efficiency" point actually speeds up assemblies because of the diagonally cut points, one of which is longer than the other. This type cotter serves as a drift pin in aligning parts. A blow of a wrench or twist of pliers on the point of the longer shank spreads shanks apart quickly. Your jobber can supply you with Lamson cotters out of stock.

THE LAMSON & SESSIONS COMPANY, 1971 W. 85th St., Cleveland 2, Ohio

Plants at Cleveland and Kent, Ohio; Chicago and Birmingham

LTS AND NUTS · LAG SCREWS · SEMS · LOCK NUTS · CAP SCREWS · COTTERS · SET SCREWS · DARDELET RIVET BOLTS · KEY BOLT

LAMSON & SESSIONS

Ask your Jobber for the Lamson Line

DS · STOVE BOLTS · SHEET METAL SCREWS · WIRE ROPE CLIPS · PIPE PLUGS · WEATHER-TIGHT BOLTS · MACHINE SCREWS AND NUTS · SPECIAL

Bills like this

MAKE CUSTOMERS BOIL!

THE small precision springs that actuate highly complicated, expensive machines such as comptometers, typewriters, cash registers and similar equipment are in themselves not very expensive. But when one fails, as sometimes happens, repair costs run high. A badly needed machine is tied up. Customer good will evaporates.

The moral is obvious — when it comes to springs, only the *best* are good enough.

The best springs, whether you buy them or make them yourself, start with the best spring wire Music Steel Spring Wire.

Music Wire has for years been accepted as the finest wire for quality spring making. Its price is higher than ordinary spring wire. But, when you figure how very little extra it costs per spring or per machine to insure uniform, flawless, life-time spring performance, it seems penny-wise and pound-foolish to use anything else in high quality equipment.

In U·S·S American Music Wire we offer you the finest wire of this type produced *anywhere* . . . not only equal to the finest imported product, but acknowledged by leading spring makers and users as definitely better.

U·S·S American Music Wire is available NOW — in any quantity you want. If you are interested in *immediate delivery*, write us.

U·S·S AMERICAN

MUSIC WIRE

Steel Spring

If you make it of WIRE... make it of the BEST!

USS AMERICAN MANUFACTURERS WIRE UNITED STATES STEEL

American Steel & Wire Company

Cleveland · Chicago · New York

Columbia Steel Company

San Francisco

Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*

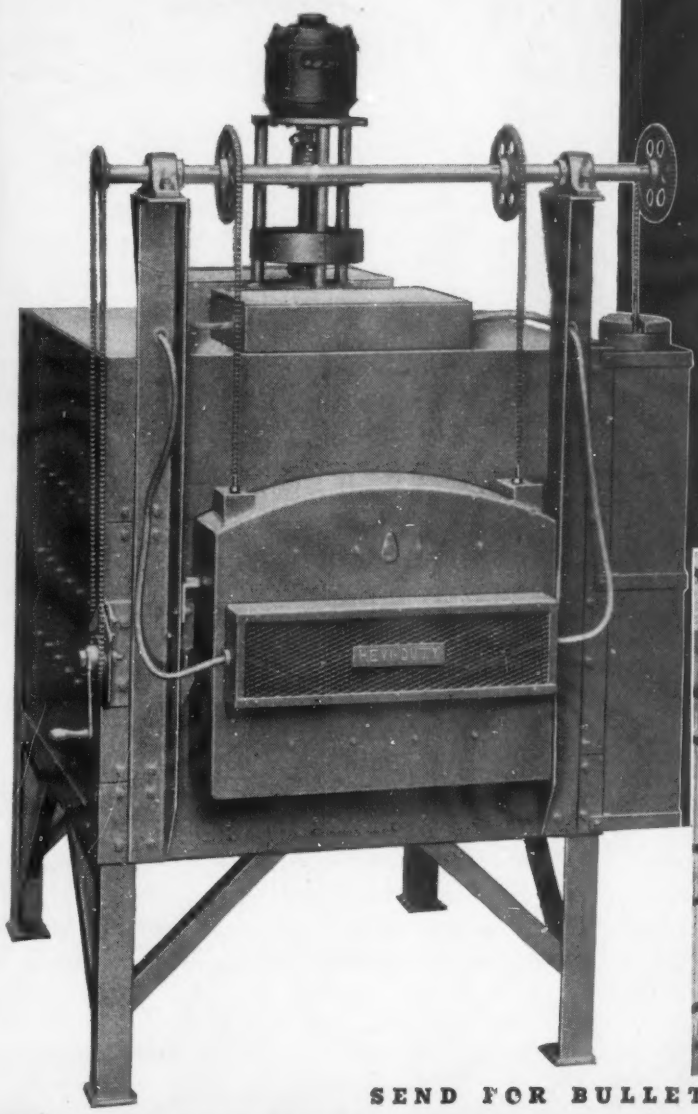
United States Steel Export Company, New York

UNITED STATES STEEL

the Chief Advantages OF THE HEVI DUTY Multi Range CONVECTION FURNACES Box Type

400° F TO 1850° F

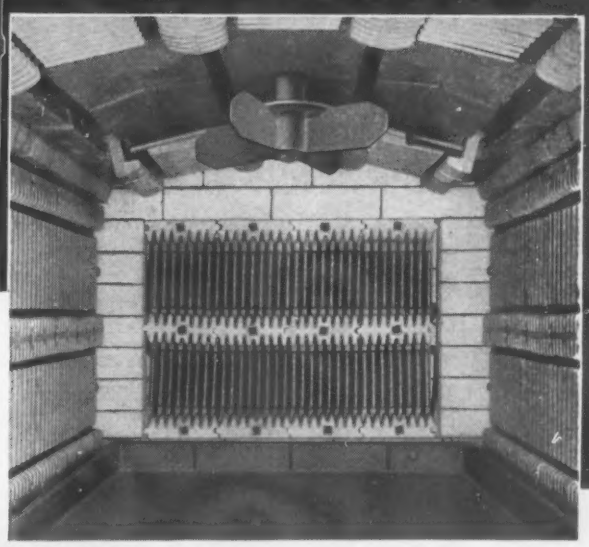
Type H D - 243618 - A — 40 K W Rating. A Multi Range Convection Furnace used for heat treatment of LOCOMOTIVE SPRINGS.



Are

- USE OVER A WIDE RANGE OF TEMPERATURES WITH
- HIGH DEGREE OF UNIFORMITY
- USE WITH OR WITHOUT FAN AGITATION
- WITH OR WITHOUT PROTECTIVE ATMOSPHERE
- PLAIN OR ROLLER RAIL HEARTH

Below: Interior view of a Multi Range Convection Furnace.



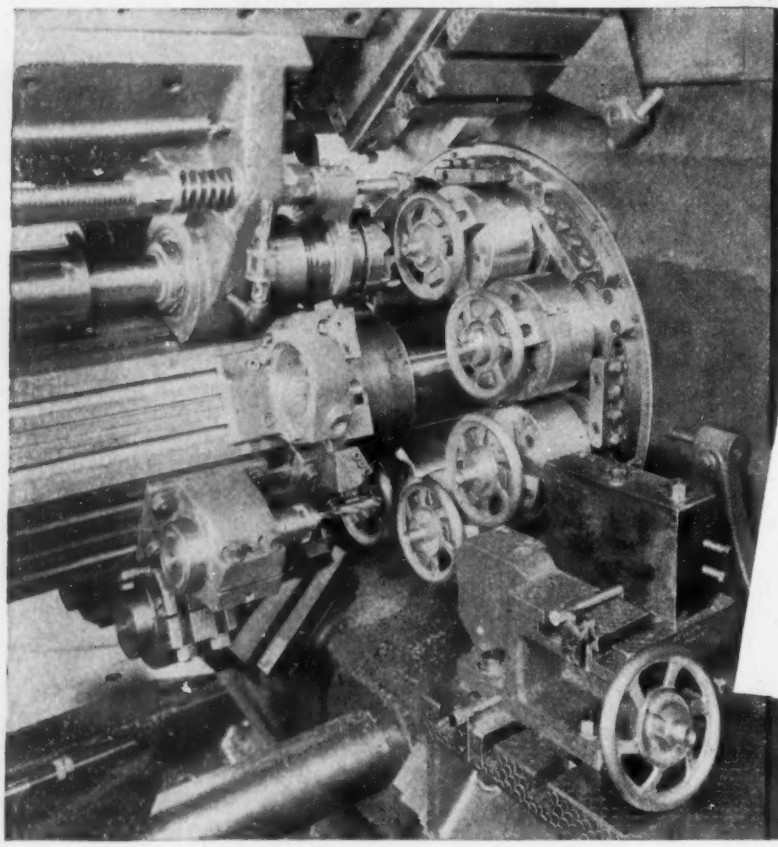
SEND FOR BULLETIN HD 341

HEVI DUTY ELECTRIC COMPANY

HEAT TREATING FURNACES HEVI DUTY ELECTRIC EXCLUSIVELY

MILWAUKEE, WISCONSIN

PRODUCTION MACHINES THAT *Sell Goods*



Example OF MODERN COST CUTTING

This sewing machine hand wheel, of cast iron, requires 16 operations for finishing. The entire job is done on an Acme-Gridley 6″ RPA 8-Spindle Chucker in 44 seconds. Carbide tipped tools are used for the forming and turning cuts. Two machines do this job, and fourteen other important jobs, with a simple change of tooling. That's versatility—and economy.

Respect from the Sales Department has been earned, in many a business, by Acme-Gridley 4, 6 and 8 Spindle Bar and Chucking Automatics.

These truly modern production machines turn out precision metal parts FASTER. They help keep costs down—a highly important fact in these times of advancing material prices and higher wage rates.

The result, for the Sales Department, is either a lower selling price, to attract business, or a better margin where selling prices are standardized. *Your* Sales Department is interested in having you get complete Acme-Gridley information.

The NATIONAL ACME CO.

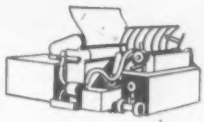
170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

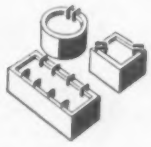
WHEN

YOU'RE FIGURING FUEL-COST-PER-TON — FINISHED AND SHIPPED

YOU CAN'T AFFORD DOWN-TIME FOR POT REPAIR



YOU WANT THE WORK AND THE PROCESS (NOT THE FIRING) TO FIX POT SHAPE



THEN

the logic of KEMP tin and lead melting shows up

FUEL costs, for melting, as in dip tinning or lead patenting, are no small factor in the ultimate cost-per-ton of product. Therefore, the opportunity to cut them 30 to 40% by more efficient firing is something to think about.

It's not at all unusual for a switch to KEMP immersion-firing to save that much—because the heat (all of it) is liberated right in the molten metal, not outside the pot. And none is lost to the setting except by flow through the work.

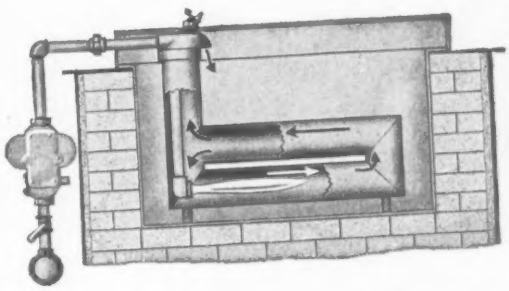
By the same token, pot wall temperatures are lower (from the molten metal temperature *down*)—and more uniform! That's why you enjoy longer pot life with less down-time for maintenance and repair.

And KEMP immersion-firing loops can be of any shape you wish. They can be located in the bath where most convenient to your work and your process. You have full freedom in specifying the setting style you want.

There are 29 years of experience in carbureted-combustion and immersion-melting behind the coupon in the corner. Use it.

WITH MODERN IMMERSION-FIRING YOU HEAT THE METAL—NOT THE POT

Combustion is within tubular loops totally immersed in the metal. Recirculation of hot combustion gases around each loop (driven by the force of the burner flame) promotes efficiency and uniformity of temperature over the loop surface. When the hot gases do exhaust, they vent down over the molten metal surface, reducing heat losses from the system, and minimizing dross. Standard designs have metal capacities from 2 to 20 tons—special sizes and shapes, and larger capacities, quoted on request.



KEMP OF BALTIMORE

PRECISION CARBURETION + ADAPTED COMBUSTION
FOR INDUSTRY'S HEAT-USING PROCESSES
ATMOSPHERE GENERATION & ADSORPTIVE DRYER SYSTEMS
FOR PROCESS CONTROL AND PROTECTION

JMLco K-1st

The C. M. Kemp Mfg. Co.
204 E. Oliver Street, Baltimore 2, Md.

Have a field-engineer come look at our soft-metal melting setup. We want to save 30 to 40% in fuel cost..... ☐

NAME_____

TITLE_____

COMPANY_____

PLACE_____

Research Pays Off *Again*

The Udylite Plating Barrel has always been outstanding for durability and long service life. Now the Udylite research staff has added practically 100% to its value by the use of a new material "Melamine Plastic" plus a new construction technic that gives the barrel much greater strength and completely insulates the structural members.

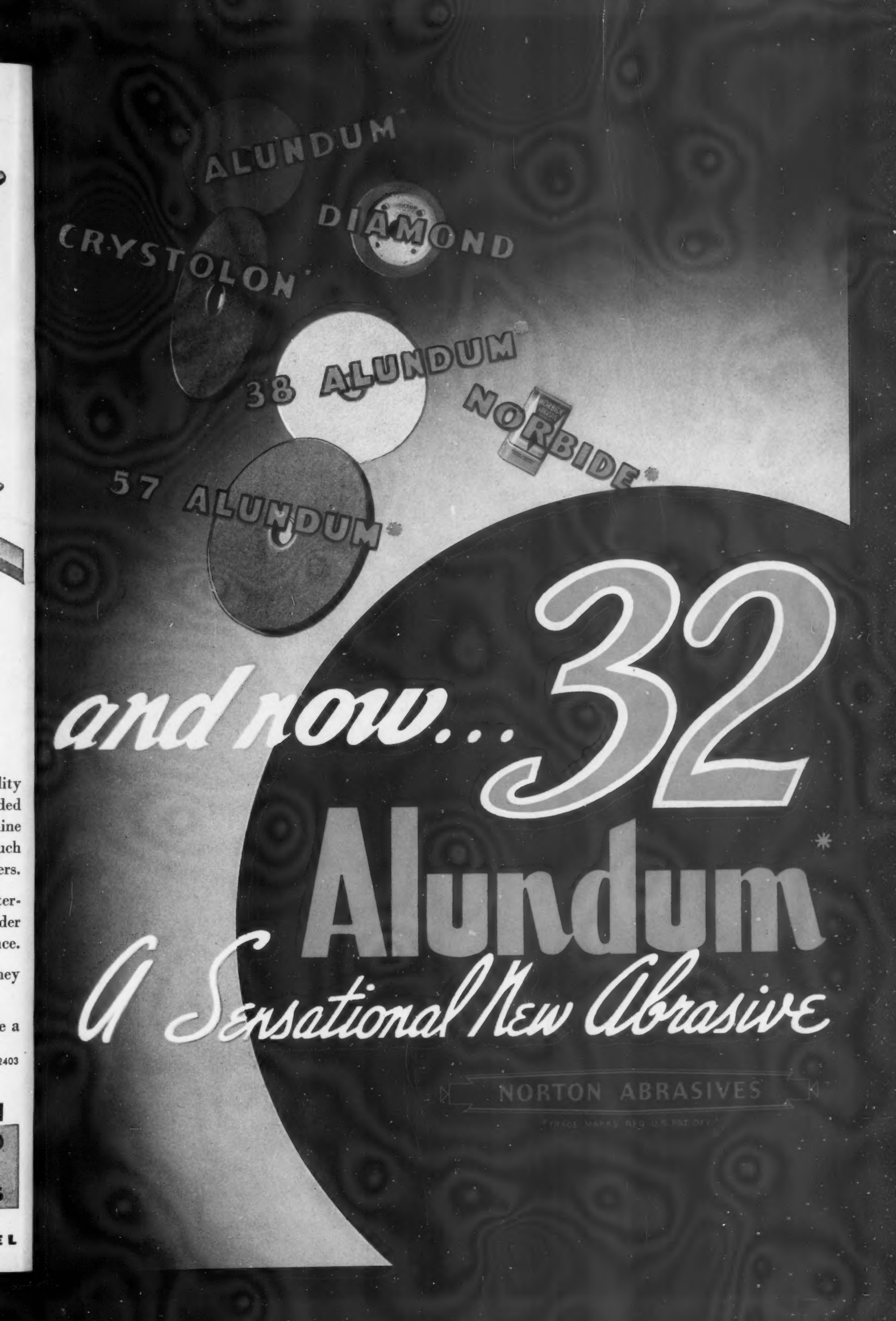
It's now being used for both alkaline and acid solutions. It's interchangeable with other older Udylite barrels and will stand up under extremely severe service with a negligible amount of maintenance.

It might be hard to believe all these things of this new barrel if they had not been proved in actual service and just as stated.

Now when you need additional plating barrels do not fail to have a look at the new Udylite Melamine Barrel.

2403

THE **Udylite** CORPORATION
1651 EAST GRAND BOULEVARD
DETROIT 11, MICHIGAN
REPRESENTATIVES IN ALL PRINCIPAL CITIES


ALUNDUM
DIAMOND
CRYSTOLON
38 ALUNDUM
NORBIDE
57 ALUNDUM
and now... 32
Alundum
A Sensational New Abrasive
NORTON ABRASIVES

The Most Important Development since NORTON introduced in 1901

the original Electric-Furnace-Made Aluminum Oxide Abrasive (ALUNDUM*)!

CUT FASTER

CUT COOLER

FEWER DRESSINGS

LAST LONGER

32 ALUNDUM ABRASIVE

WHAT "32" IS

An entirely new type of aluminum oxide abrasive.

Radically different in appearance.

Radically different in shape.

Made differently by a Norton-invented and patented process.

Each super-cutting grain is a single crystal — individually produced in the electric furnace — not crushed to size.

First and only abrasive with a sharp, nubbly surface for super cutting action.

The only abrasive which combines a strong grain structure with a cool cutting action.

WHAT "32" DOES

Cuts deeper and faster

Cuts freer without burning

Requires fewer dressings

Gives longer wheel life

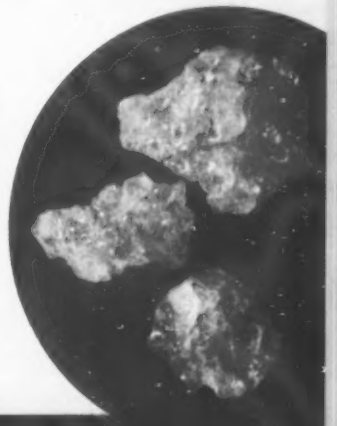
Reduces grinding time

HOW "32" IS MADE

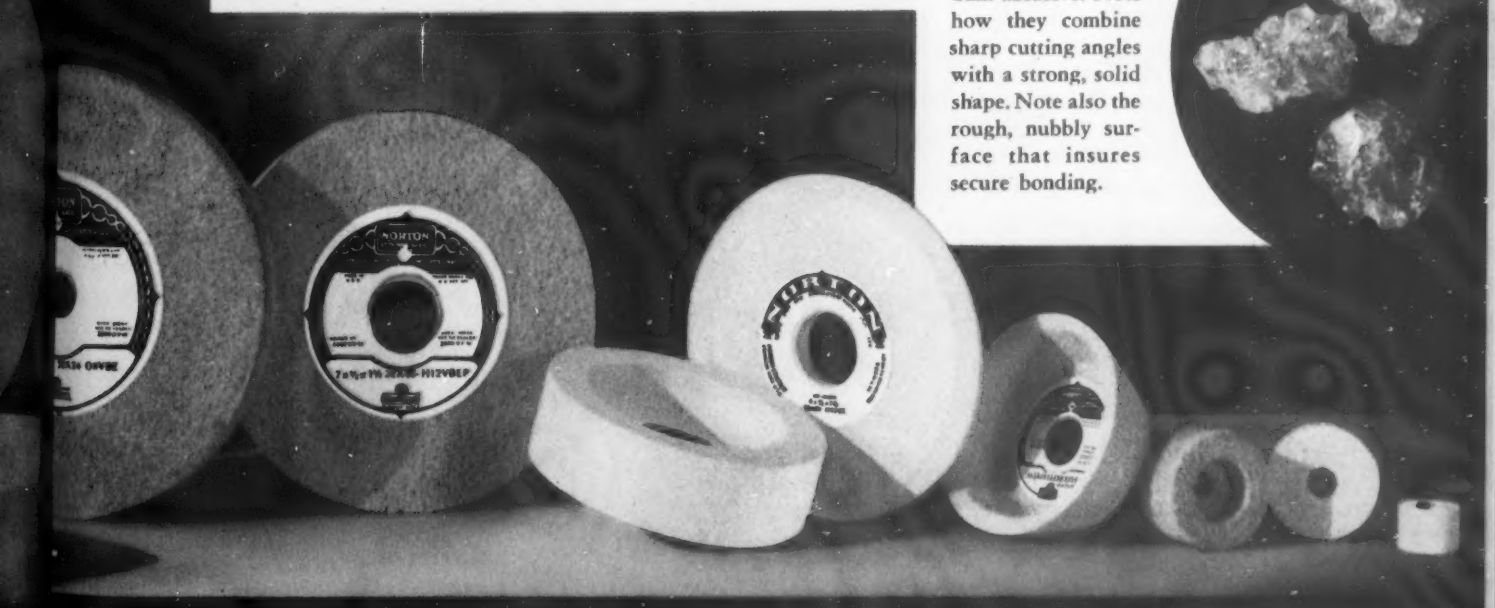
32 Alundum abrasive is made by a patented Norton process which creates single crystals of high purity in a fluid matrix in an electric furnace. Each crystal being separately formed has a strong, solid shape and many sharply pointed nubs. To retain these many sharp cutting edges the crystals are not crushed but are separated from the matrix by a complicated and continuous chemical process. They are then screened without crushing into the standard grain sizes. The great number and the sharpness of the nubs enable grinding wheels of 32 Alundum abrasive to penetrate metal deeper, cleaner and faster.

Stocks of Wheels For Surface, Tool and Internal Grinding Available Now

Tests on other types of grinding are in progress and the use of 32 Alundum wheels will soon be extended into other fields.



Here's a photomicrograph of typical grains of 32 Alundum abrasive. Note how they combine sharp cutting angles with a strong, solid shape. Note also the rough, nubbly surface that insures secure bonding.



NORTON ABRASIVES

Here Are a Few Examples of the Sensational Performance of

32 ALUNDUM GRINDING WHEELS

TOOL GRINDING
8 x ½ x 1½" — 32A54-K5VBE

"On cutters, reamers, and end mills of high speed steel and molybdenum steel it cut faster and gave better finish than previous wheel without discoloring the work. Held corner better and cut much cooler."

TOOL GRINDING
7/5 x 2 x 1¼" — 32A54-J5VBE

"Cut cooler and faster than any wheel ever tried. Adopted in place of competing wheel."

SURFACE GRINDING
12 x 2 x 5" — 32A46-G8VBE

"Best wheel ever used on high carbon, high chrome steel. Removed .002 to .003" of stock compared to .0005" with previous wheel. Longer life."

SURFACE GRINDING
Segments in Norton Chuck
32A36-E12VBEP

"Much better than competing product. Cut cool and fast—less burn, little dressing, life three times longer."

INTERNAL GRINDING
¾ x ¾ x ⅜" — 32A60-J8VBE

"Most outstanding internal wheel ever used at this plant. Cut six times faster, or .003" per pass compared to .0005". Excellent finish. Life tripled. No dressing required."

ENTHUSIASTIC reports like these are coming in from plant after plant where 32 Alundum wheels have been tested. Now you can enjoy the same outstanding performance on your surface, tool and internal grinding jobs.

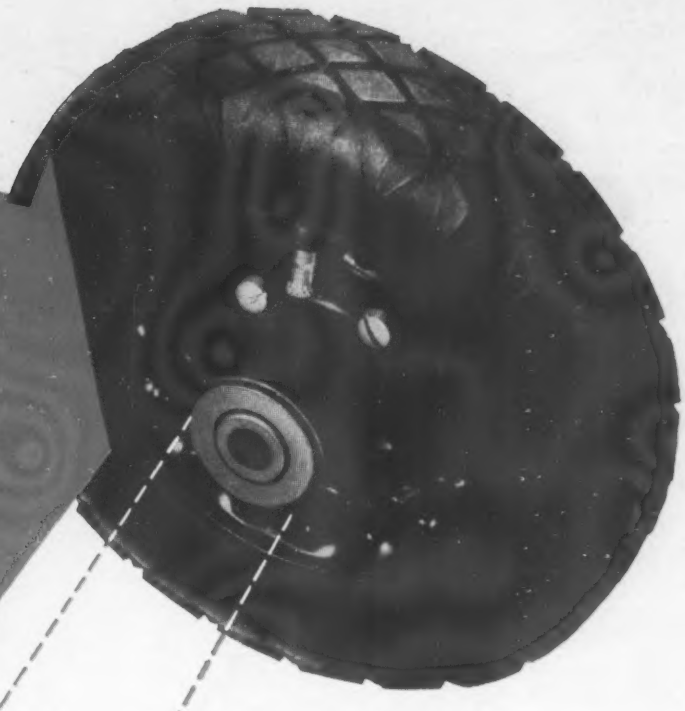
Because 32 Alundum grinding wheels are so sharp compared with other wheels a change in grade or in grain size is often necessary when making conversions. Your Norton abrasive engineer or distributor's abrasive specialist will be glad to give you the proper 32 Alundum wheel specifications. Or write to the Sales Engineering Department giving full information about your jobs, including the specifications of the wheels now being used.

NORTON COMPANY, WORCESTER 6, MASS.

New York · Detroit · Chicago · Cleveland · Pittsburgh
Philadelphia · Denver · Los Angeles · Hamilton, Ontario

Behr-Manning Corporation, Troy, N. Y., is a division of Norton Company

High Production Costs UPSET *again . . .*



with Republic ELECTRUNITE *Tubing*

It's the upset OD flange on this pneumatic wheel hub which made production operations costly before ELECTRUNITE Tubing was adopted for this close-tolerance application.

To avoid damaging strain on costly dies and press in upsetting, tubing OD and ID tolerance requirements are extremely close—plus .005", minus .000". With tubing previously used, variations in wall thickness and concentricity necessitated rigid inspection before fabrication . . . 90% of the tubing was rejected . . . scrap rate among finished hubs ran approximately 10%.

Now, ELECTRUNITE Tubing has changed the picture entirely. Because of its *consistent* uniformity of wall thickness and concentricity, pre-fabrication inspection routine has been eliminated . . . every length of tubing meets upsetting requirements . . . scrap rate among finished hubs has dropped to zero.

Yes, *uniformity* is a plus value of ELECTRUNITE Tubing . . . a plus value which pays profit dividends in every application. For complete information, including list of sizes in both carbon and stainless steel analyses, write to:

REPUBLIC STEEL CORPORATION
STEEL AND TUBES DIVISION • CLEVELAND 8, OHIO
Export Department: Chrysler Building, New York 17, New York

Republic
ELECTRUNITE TUBING

Mechanical, Aircraft, Stainless Steel and Rail Steel Tubing—Boiler, Condenser and Heat Exchanger Tubes

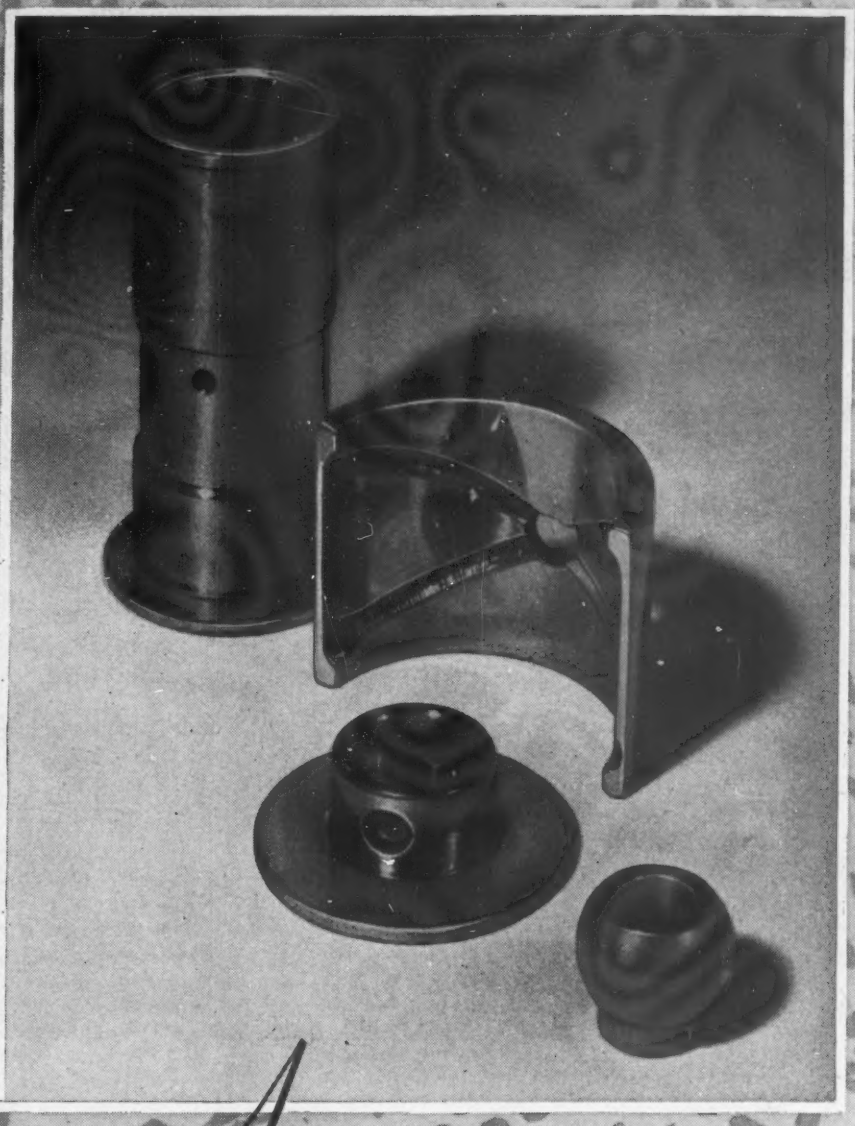
Stall an ordinary motor too long and you're ready for a fire extinguisher and a new motor. Stall this Welco Forced Air Ventilated Motor all day, every day if need be, and it will be ready for nothing but more work.

This Welco Motor is applicable to operations such as clamping, holding, feeding, indexing, slow speed reeling, rapid reversing or any job where frequent or continued heavy torque may be required.

This is just one example of a special motor for a specific need, designed and built by Welco Engineers. We solicit your toughest powering problems.

THE B. A. WESCHE ELECTRIC CO.

Dept. SS, 1628-23 Vine Street **Cincinnati 10, Ohio**



A sleeve bearing designed to operate with film lubrication has load capacity that increases with increase in speed. This attribute is of basic importance in design and is another advantage in the use of Bunting Cast Bronze Bearings. The Bunting Brass & Bronze Co., Toledo 9, Ohio. Branches in principal cities.

Bunting

BRONZE BEARINGS ☆ BUSHINGS ☆ PRECISION BRONZE BARS

50

Want to meet a CLASS A SCULPTOR?

I'm a sculptor in wood—a wood carver. In the front office, they call me a patternmaker.

My job is to take a blueprint or drawing of a mechanical part and make a wooden model of it—a pattern.

That pattern is used to make a mold for a steel casting. Maybe my job is the most important in the whole foundry, because if I don't make the pattern right, the mold won't be right and the casting will be no good and the whole thing goes pfooie.

The real answer is that a good steel foundry is a team on which all players must click—the patternmaker, the melter, the molder, the coremaker, cleaner, heat treater, tester and all.

You are my boss—I work for you. Because I know my job and all the others on the team know theirs, you get better steel castings.

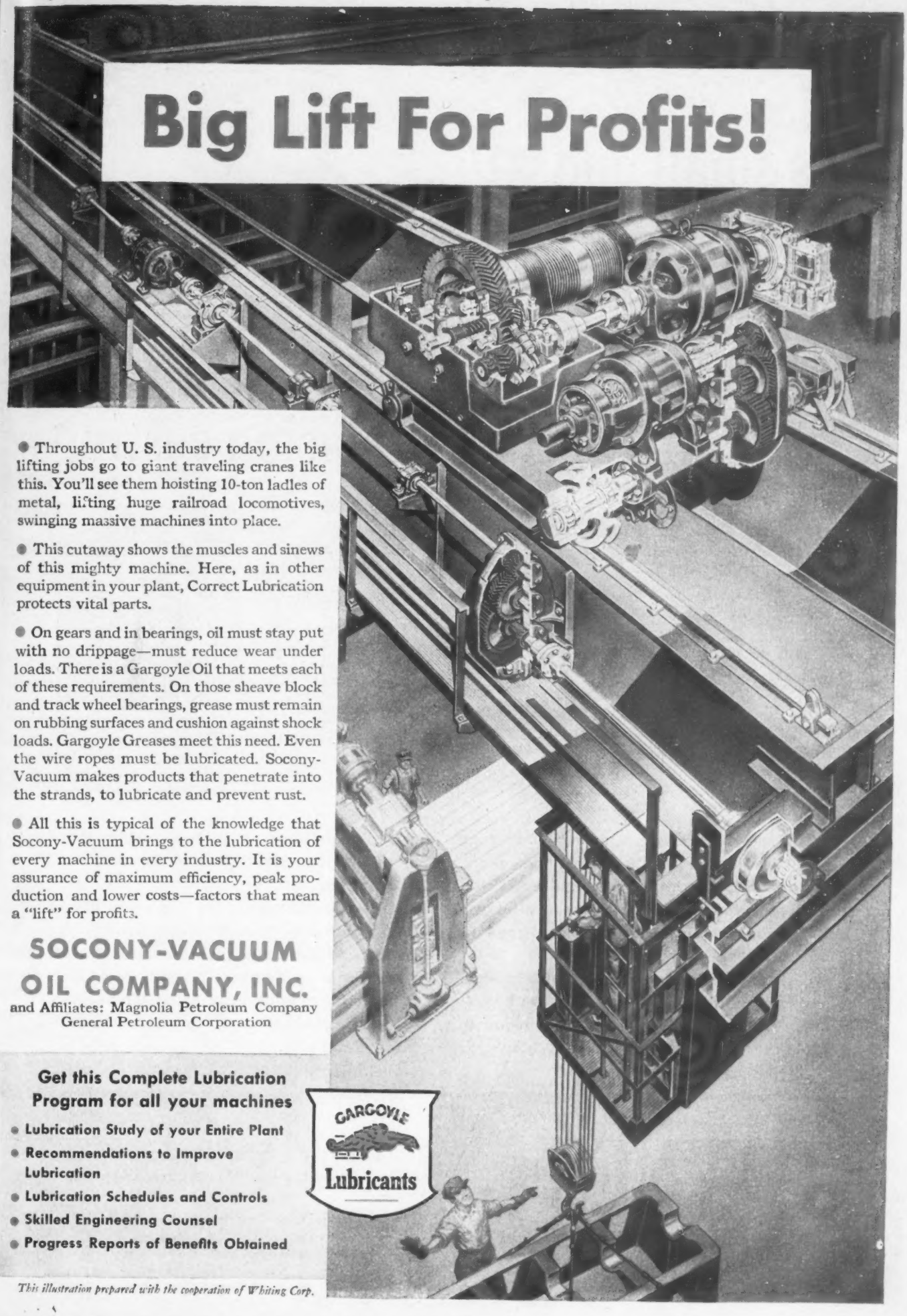
' ' '

The first step in building an improved product, or in cutting costs, is to plan it that way—a steel castings engineer can help you. Steel Founders' Society, 920 Midland Bldg., Cleveland 15, Ohio.

MODERNIZE AND IMPROVE YOUR PRODUCT WITH

STEEL CASTINGS

Big Lift For Profits!



● Throughout U. S. industry today, the big lifting jobs go to giant traveling cranes like this. You'll see them hoisting 10-ton ladles of metal, lifting huge railroad locomotives, swinging massive machines into place.

● This cutaway shows the muscles and sinews of this mighty machine. Here, as in other equipment in your plant, Correct Lubrication protects vital parts.

● On gears and in bearings, oil must stay put with no drippage—must reduce wear under loads. There is a Gargoyle Oil that meets each of these requirements. On those sheave block and track wheel bearings, grease must remain on rubbing surfaces and cushion against shock loads. Gargoyle Greases meet this need. Even the wire ropes must be lubricated. Socony-Vacuum makes products that penetrate into the strands, to lubricate and prevent rust.

● All this is typical of the knowledge that Socony-Vacuum brings to the lubrication of every machine in every industry. It is your assurance of maximum efficiency, peak production and lower costs—factors that mean a "lift" for profits.

SOCONY-VACUUM OIL COMPANY, INC.

and Affiliates: Magnolia Petroleum Company
General Petroleum Corporation

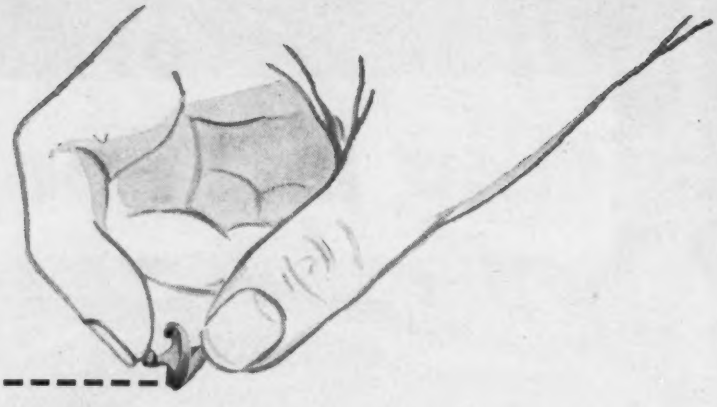
Get this Complete Lubrication Program for all your machines

- **Lubrication Study of your Entire Plant**
- **Recommendations to Improve Lubrication**
- **Lubrication Schedules and Controls**
- **Skilled Engineering Counsel**
- **Progress Reports of Benefits Obtained**

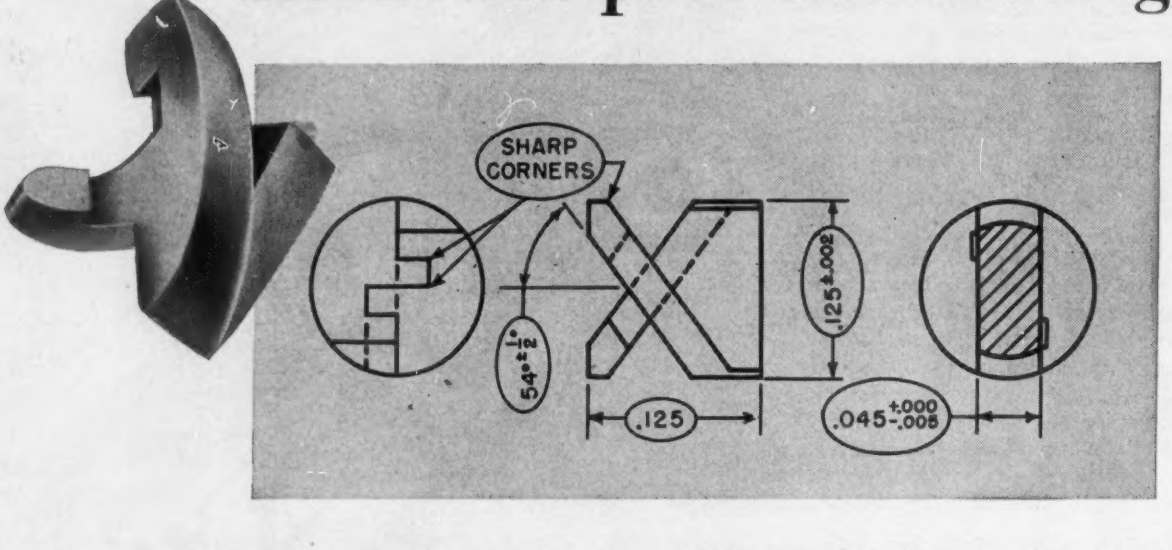
GARGOYLE Lubricants

This illustration prepared with the cooperation of Whiting Corp.

This small and intricate part.....



is economically produced by HAYNES precision casting



This spray nozzle core is made of HASTELLOY alloy C because it must resist corrosive chemicals. In spite of its intricate design and small size, it is produced to close tolerances by HAYNES Precision Casting—and is produced in quantities.

Parts of many sizes and shapes with internal and external threads or cored holes can be precision-cast with little or no finishing required. From the HAYNES line of high quality alloys you can select the one with the best combination of properties you require to resist abrasion, heat, or corrosion.

If you are interested in the properties of HAYNES corrosion-resistant alloys, write for the booklet, "HASTELLOY High-Strength, Nickel-Base, Corrosion-Resistant Alloys," Form 3361. If you want to know more about the precision casting process, ask for "HAYNES Precision Castings," Form 6244.

HAYNES TRADE-MARK *alloys*

Haynes Stellite Company

Unit of Union Carbide and Carbon Corporation

UCC

General Offices and Works, Kokomo, Indiana

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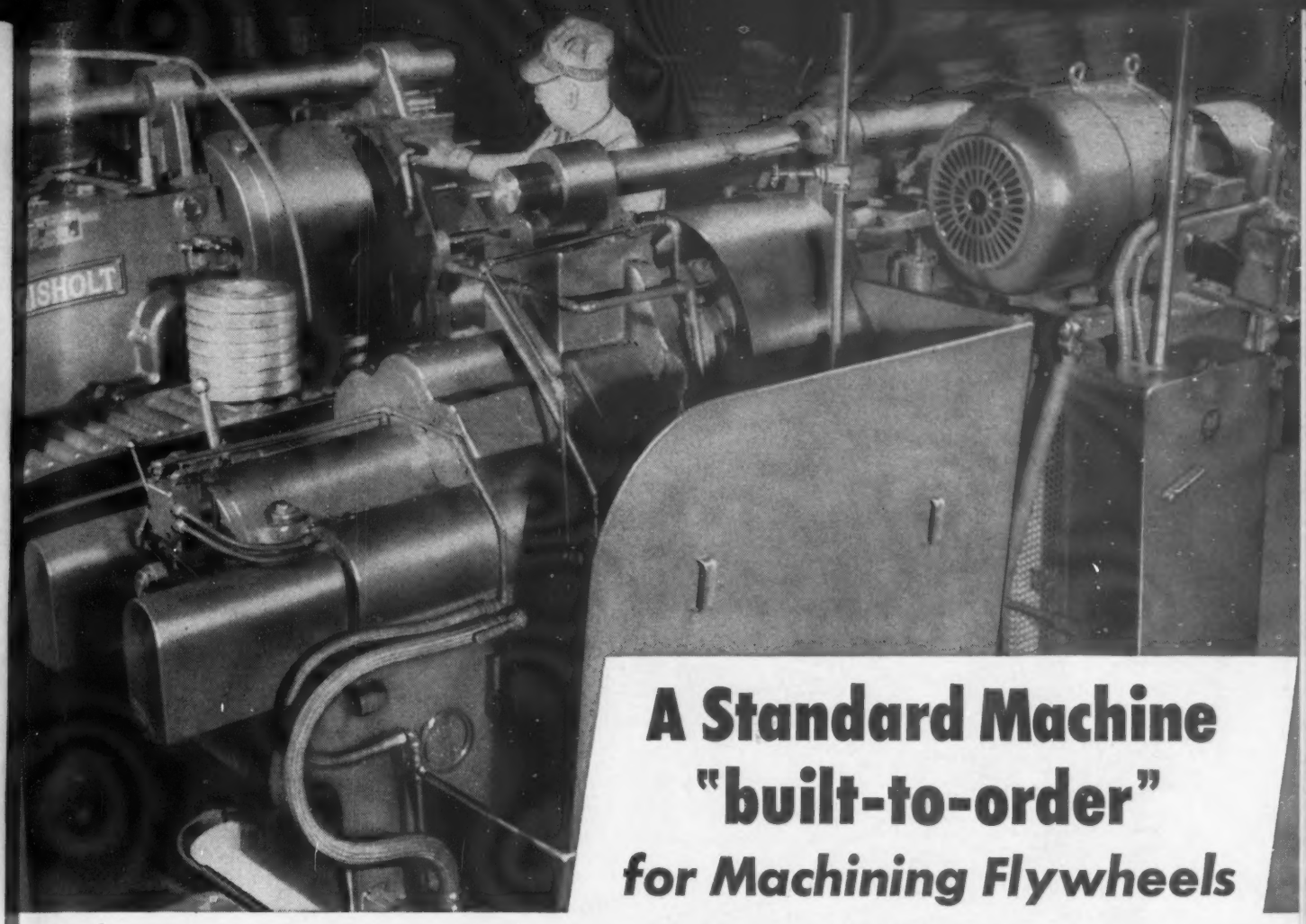
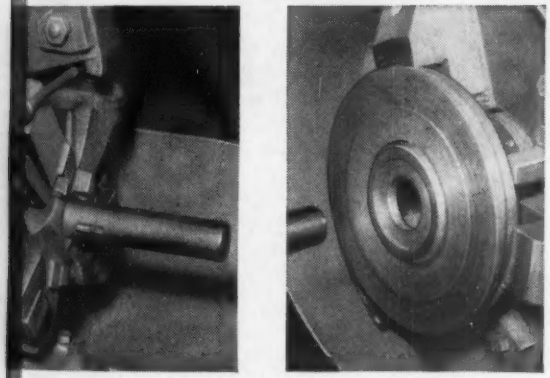
The registered trade-marks "Haynes" and "Hastelloy" distinguish products of Haynes Stellite Company.

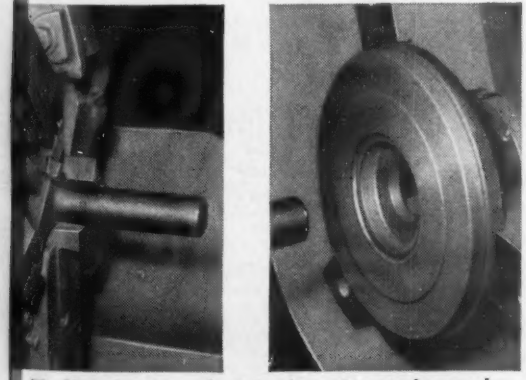


A Standard Machine "built-to-order" *for Machining Flywheels*

THE GISHOLT SIMPLIMATIC



Plunge type tooling for first operation in machining cast iron flywheels.



Tooling for second operation. Any tool may be quickly removed and replaced by a sharpened tool.

It may sound incongruous, but it isn't.

This standard Gisholt Simplimatic of the vertical head type provides the ideal tooling set-up to duplicate the ability of a machine designed for a specific job—in this case of machining flywheels. In only two operations of 1.3 minutes each, both faces of flywheels are rough machined on all surfaces.

The simple basic design of this modern automatic lathe makes it possible to individualize the machine to answer a wide variety of machining jobs with high production and low cost. Available in both vertical head and platen types, the Gisholt Simplimatic is a wise selection where you have parts to produce in large volume. Ask for all the facts about it.

GISHOLT MACHINE COMPANY

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Keep Ahead : : !
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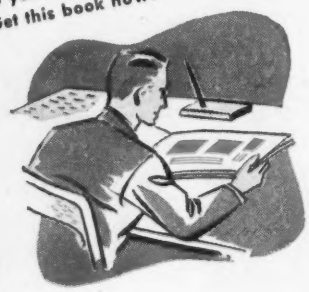
A NEW BOOK FOR STEEL PLANT AND FOUNDRY EXECUTIVES

Important information on high silicon pig iron for steel plants and foundries . . . a valuable addition to your file of technical data. Get this book now!



IN THIS BOOK . . .
Scores of photographs, seven beautiful oil paintings, and interesting, informative text tell you about Keokuk's special methods of processing and casting of high silicon pig iron. The book relates the advantages of 60-pound Electro-Silvery pigs for steel plants and 30-pound pigs and 12½-pound piglets for foundries. Write today and request your copy!

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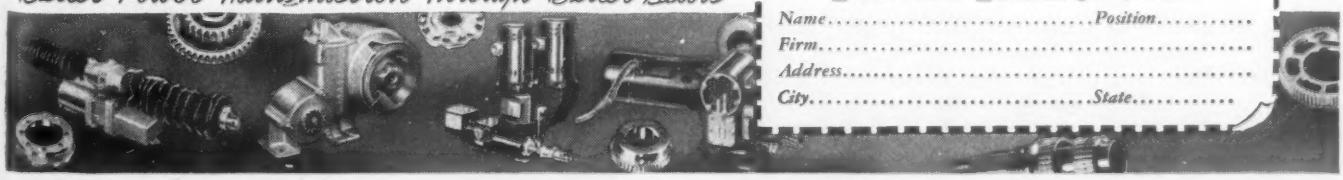
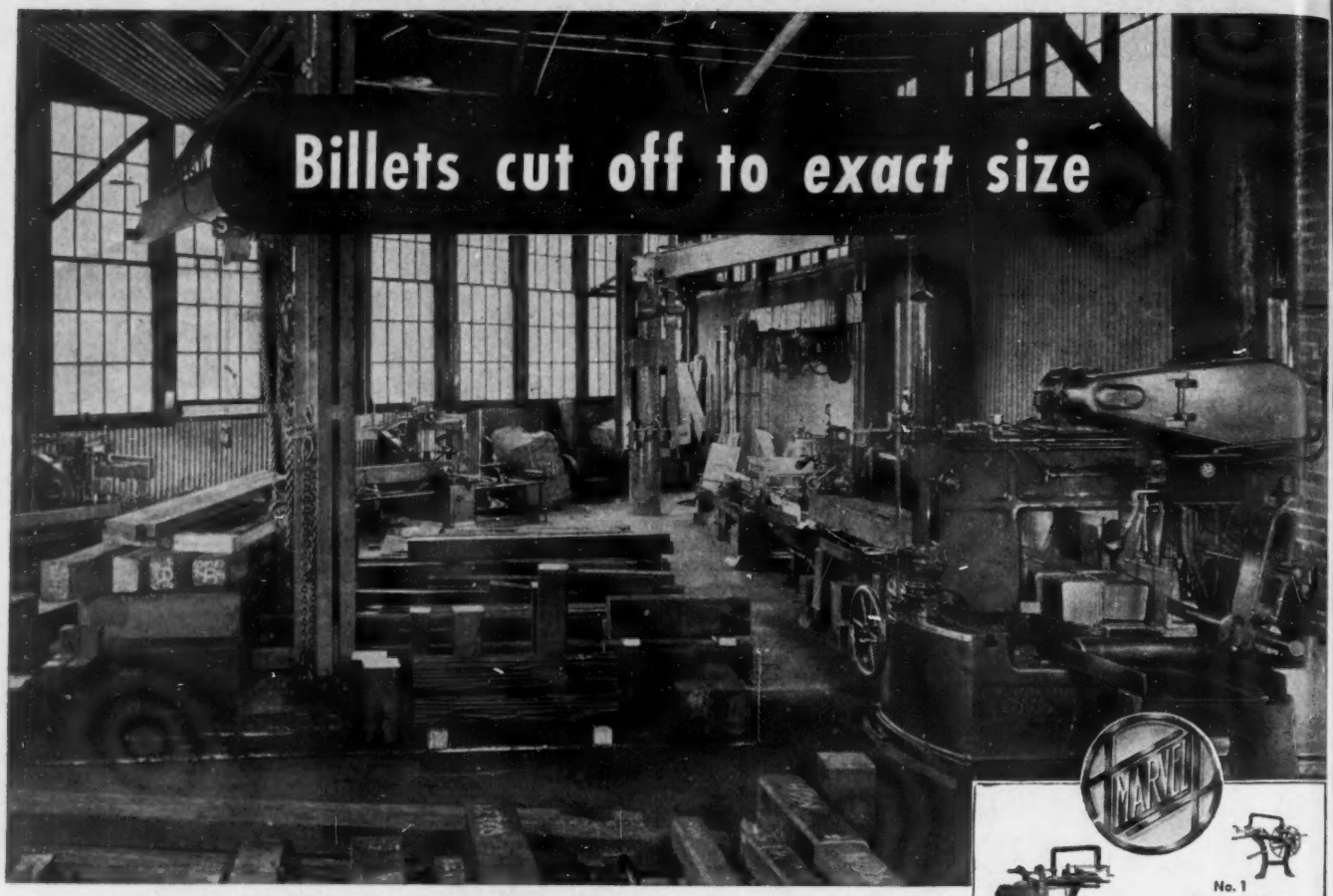
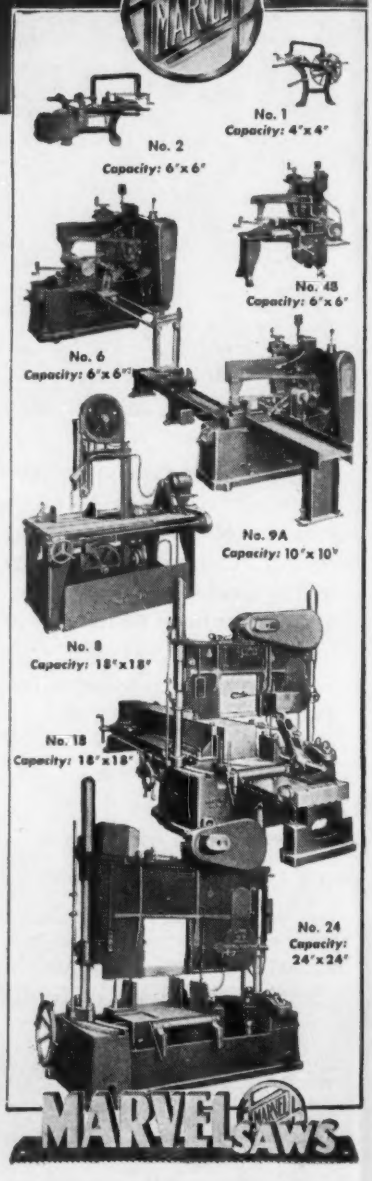




ANY QUANTITY CUT-OFF AUTOMATICALLY

These MARVEL Saws are money makers for this modern forge shop in many ways. (1st) they cut off billets for a small fraction of the cost of cutting-off with a hammer. (2nd) these billets are so accurate in size that they exactly fill the dies with no excess fin, not only simplifying trimming and finishing, but getting extra billets from many bars. (3rd) they keep all hammers busy on *production* work for these "world's fastest" saws can keep ahead of any schedule. (4th) they reduce cutting-off labor costs to an absolute minimum. It takes only one operator and a helper to keep all of these saws running because all but the No. 18 Giant Hydraulic Saw (at the right) are *automatic* —feed measure, and cut-off identical billets; requiring no more attention than automatic screw machines.

Your local MARVEL Sawing Engineer will gladly call and explain how you can add these four extra profits to your forge operation.



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Unit-cast ball-bearing rotor, dynamically balanced; parts interchangeable end to end.

Double-shell frame with new simplified cooling system.

Extra-large conduit box; can be made watertight by addition of gasket; usable in four 90° positions.

Extended, accessible mounting feet, cast as a unit with main frame.

When we say that this totally enclosed, thoroughly insulated motor is new, we mean *new* . . . in improved materials, in design practices, in maintenance ease and simplicity, and in cool-running, trouble-free performance.

Easier to attach to tools, and usable in four 90° positions, the new Delco motor is the answer to the production man's prayer for lower maintenance costs and less "down-time." Where machine tools operate under unfavorable conditions, the dirt and dust that clog open-type motors are no problem with this totally enclosed performer.

Don't specify another motor until you get *all* the data on the new Delco. It's yours for the asking.

DELCO MOTORS

DIVISION OF GENERAL DELCO PRODUCTS DAYTON, OHIO MOTORS CORPORATION

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HIGH SPEED STEELS

Whenever your cutting tools are operating under such severe conditions that a cobalt high speed steel is desirable, specify MO-MAX COBALT. It is available in four distinctive types, two with 5.00% cobalt and two with 8.00% cobalt.

If your regular sources cannot make prompt delivery on MO-MAX COBALT, we shall be glad to direct you to an available source of supply. In writing, please describe the proposed application.

Full information will be found in the MO-MAX Handbook. See Pages 27-28.

Buyer's Guide to Brands of MO-MAX

"LMW"	Allegheny Ludlum Steel Corp.
"MOHICAN"	Atlas Steels Limited
"BETHLEHEM HM"	Bethlehem Steel Co.
"MO-CUT"	Braeburn Alloy Steel Corp.
"STAR MAX"	Carpenter Steel Company
"MOLITE M-I"	Columbia Tool Steel Co.
"REX T-MO"	Crucible Steel Co. of America
"DI-MOL"	Henry Disston & Sons, Inc.
"HI-MO"	Firth-Sterling Steel Company
"REX T-MO"	Halcomb Steel Company
"MOGUL"	Jessop Steel Company
"TATMO"	Latrobe Electric Steel Co.
"MIDMAX"	The Midvale Co.
	St. Lawrence Alloys, Inc.
"S. T. M."	Simonds Saw & Steel Co.
"MO-TUNG"	Universal-Cyclops Steel Corp.
"8-N-2"	Vanadium-Alloys Steel Co.
"VUL-MO"	Vulcan Crucible Steel Co.

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1. MO-MAX has superior cutting qualities. It is a happy combination of great toughness with high hardness.
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4. In addition to the standard general-purpose composition of MO-MAX high speed steel, several special types have been developed for particular purposes. There are four with a high cobalt content, one high in vanadium and two that are especially suitable for hot die work.
5. MO-MAX was the first of the modern molybdenum high speed steels. For 13 years MO-MAX has demonstrated its superiority in cutting tools.

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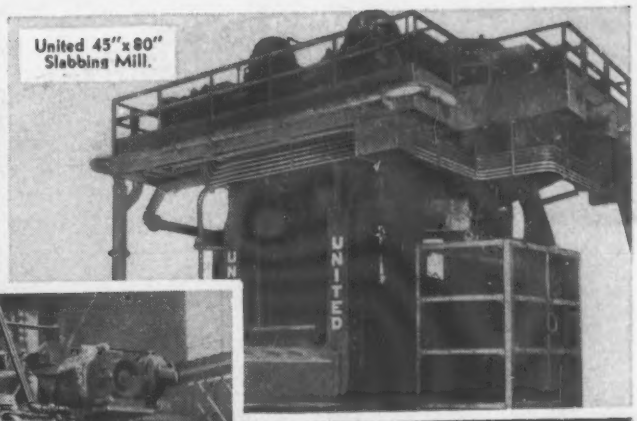
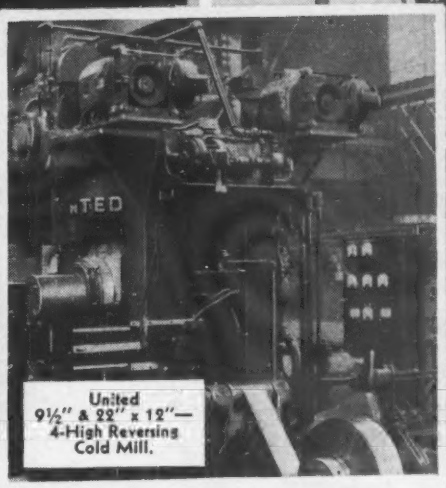
United 21" & 53" x 42" High Speed 4-High, 5-Stand Tandem Cold Strip Mill.

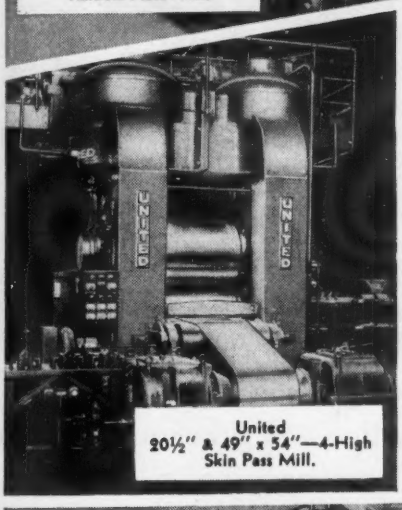

United 45"x80" Slabbing Mill.

United 100" 4-High, 4-Stand Tandem Plate Mill.

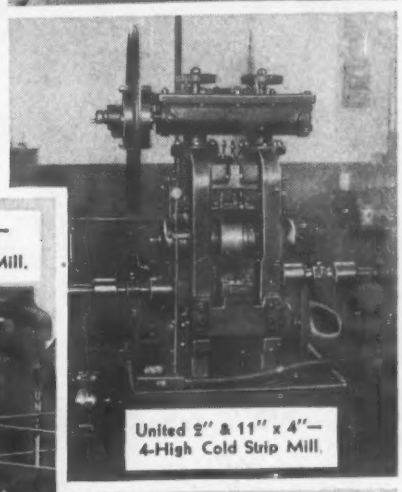

United 9½" & 22" x 12"— 4-High Reversing Cold Mill.

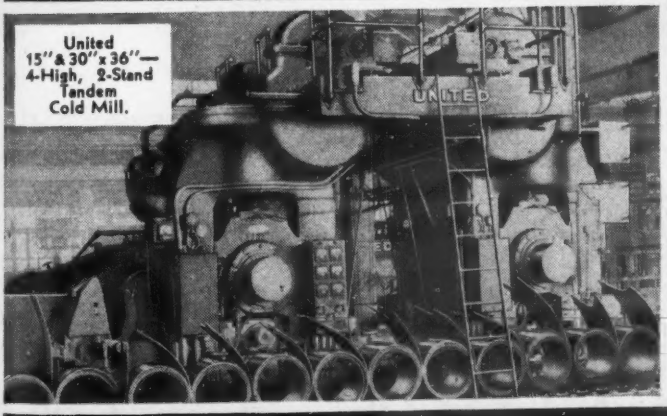
United 18" Merchant Mill.

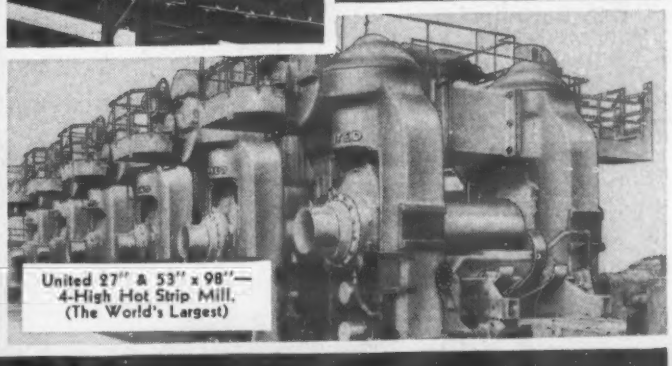
UNITED MILLS


United 20½" & 49" x 54"—4-High Skin Pass Mill.

United 28"— 3-High Bar and Structural Mill.


United 2" & 11" x 4"— 4-High Cold Strip Mill.


United 15" & 30" x 36"— 4-High, 2-Stand Tandem Cold Mill.


United 27" & 53" x 98"— 4-High Hot Strip Mill. (The World's Largest)

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ROUNDS: . . 8" Diameter
MOTOR: . . . . ½ H. P.
SPEEDS: Selective 60, 90, 130 feet per minute
WEIGHT: Approximately 750 pounds

• This Wells Metal Cutting Band Saw is indeed a handy tool. It cuts metal, fibre, plastics and other materials. Easy to use. Easy to move from one job to another. Saves time and labor, occupies little floor space . . . A Wells No. 8 will pay for itself in short order.

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METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
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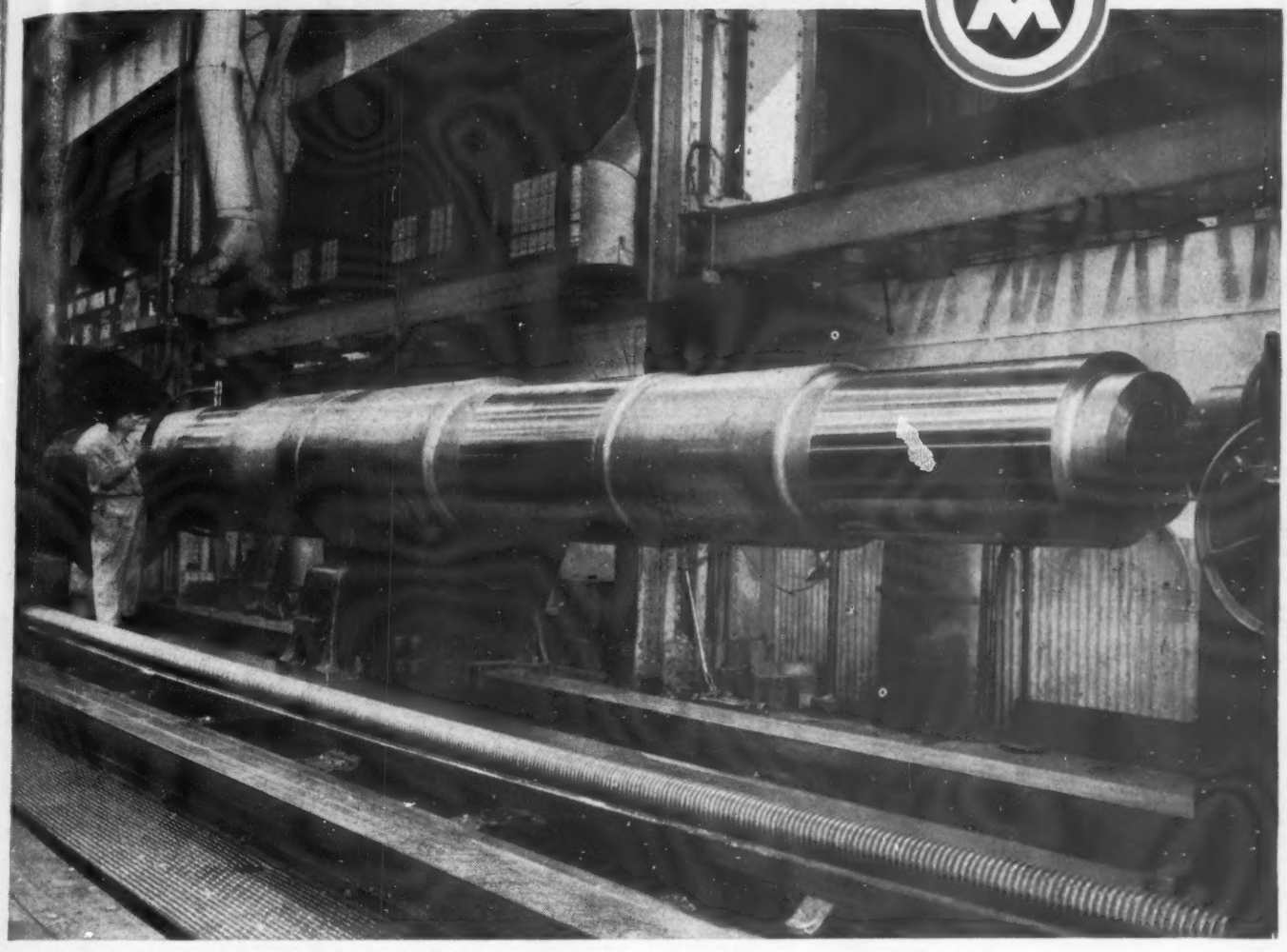

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This great, forged mine hoist shaft embodies extreme accuracy in every detail. Built perfectly to meet specifications demanding ability to withstand hundreds of tons of weight, this forging, like all Midvale forgings, passed through our quality control system. This, in effect, guarantees in melting, forging, heat treating and measurement an accuracy that has become the characteristic of Midvale manufacture.

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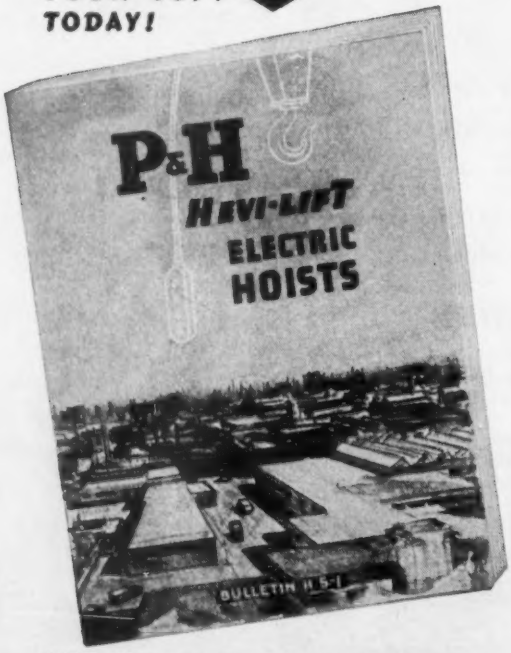

Bulletin H5-1 tells all about P&H Hevi-Lift Electric Hoists . . . where they're used . . . what kind of jobs they do. 50 pages of pictures and specifications. Get your free copy now!

Yes, *one man* does it all! Lifting . . . moving . . . "spotting" heavy loads exactly where they're wanted. And he does it all by pushing buttons!

Simple? Sure! So simple that more and more plants are finding "Thru-the-Air" handling the easiest way to cut costs — starting right NOW!

There's no waiting for results. Install a P&H Hevi-Lift Electric Hoist, and savings begin with the very first load!

Save these three ways:

(1) **SAVE TIME** . . . loads move direct, above congested aisles.

(2) **SAVE MANPOWER** . . . no wasted energies, no rehandling.

(3) **SAVE SPACE** . . . "Thru-the-Air" handling leaves floor space free.

Yes, all these savings apply to *your* plant. For details on capacities and installations, call in a P&H Hoist Engineer — no cost or obligation.

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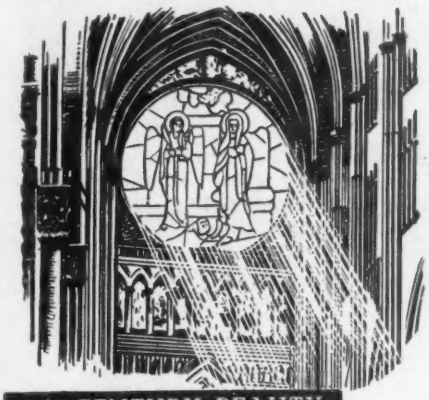
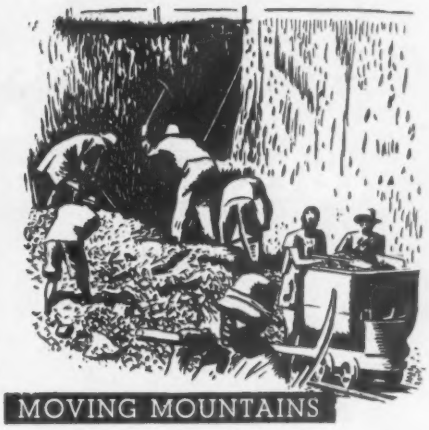
THE STORY OF MANGANESE



12th CENTURY BEAUTY

1 Manganese minerals were known in ancient times and were used to produce the rich colors of medieval stained glass windows. However, it was not until 1774 that the metal manganese was isolated. It became important to steelmakers in 1856 when Sir Robert Mushet used it to perfect the bessemer process.

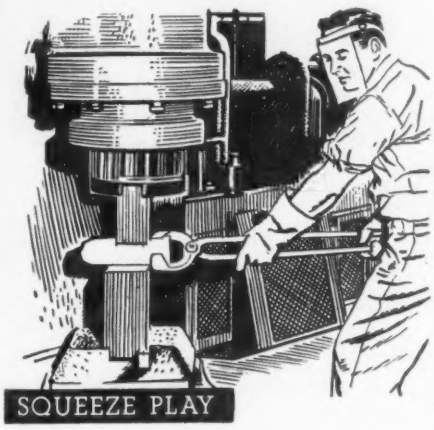


MOVING MOUNTAINS

2 Mountains of manganese ore from such far-off places as Africa, Russia, India, and Brazil are shipped each year to the United States to meet our nation's requirements. In Electromet's furnaces, these ores are reduced to ferromanganese, silicomanganese, and other alloys of high purity.

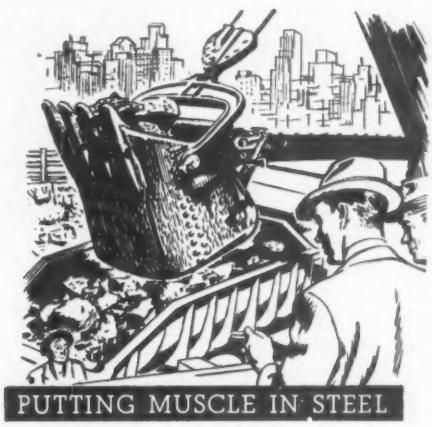
TAMING THE BREW

3 Manganese is the most important alloy used in steelmaking. It has a powerful attraction for oxygen and sulphur—gathering and removing these impurities as a slag during the deoxidizing process. One of the best of all deoxidizers is silicomanganese—a combination alloy of silicon and manganese.



SQUEEZE PLAY

4 By combining with sulphur, manganese removes the principal cause of hot-shortness—thereby giving steel better rolling and forging properties. It imparts great strength and toughness, and that's why all steels—castings, forgings, and rolled products—contain at least small amounts of this metal.



PUTTING MUSCLE IN STEEL

5 Manganese makes steel tough. Steel containing about 13 per cent manganese is "work-hardening," that is, it possesses the property of increasing in hardness as the metal is worked. Steam shovel teeth, crushing machinery, and railroad switch frogs would quickly wear out, were it not for this property.

Aid To Steelmakers

Electromet's staff of experienced and well trained metallurgical engineers are always ready to assist you with the proper use of ferro-alloys, and help you solve other metallurgical problems relating to melting procedures. These men are familiar with the most efficient and up-to-date shop practices. Their specialized knowledge has assisted customers in solving many metallurgical problems. For further information write for our booklet "Electromet Ferro-Alloys and Metals."

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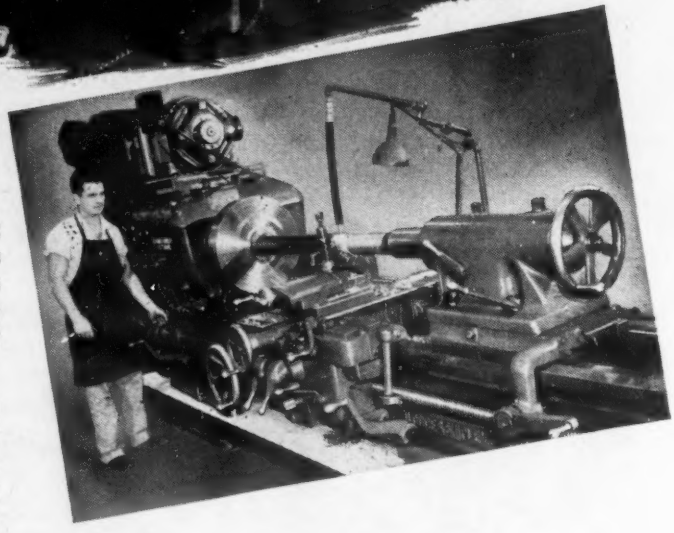

L & S Lathes are busy at this famous plant giving new meaning to those old words "Power and Versatility." Illustrations show L & S 14″ and 25″ Lathes producing for Lockheed models that are creating aviation history.

Forming rolls, dies, fixtures, spinning chucks, shafts, screws, jigs and many other parts are produced quickly and efficiently. In working metals "ranging from non-ferrous alloys to extremely tough steels," this world-known firm reports: "the Lodge & Shipley Lathe is a rugged machine . . . it holds to tolerances of .0005 constantly and has the power needed in removing stock."

Standard high speed tools as well as carbide tipped tools are used in a wide variety of machining operations, such as "turning, boring, facing and threading." In addition to the production of parts for blanking, forming, mating and assembling of airplanes and parts, these L & S Lathes play an important part in maintenance replacement.

L & S Lathes possess tremendous strength, yet assure utmost accuracy and output. L & S Engineers will gladly discuss your special lathe problems, show you the advantages of these new, powerful machines. Write on your company letterhead for new condensed catalog.

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HANDLING COMPLEX PROBLEMS in the chemical process industries makes many a purchasing and production executive wish he had as many extra hands as this ancient Hindu idol to help him through—*and he has!*

THEY ARE HIS... and yours—in the cooperation and assistance of chemists, engineers, and technicians on General Chemical Company's Technical and Engineering Service staffs. These experts are well qualified by technical training and by practical industry-wide experience to offer sound, constructive advice in many ways—whether your problems deal with industrial, scientific or agricultural chemicals.

THEY CAN FURNISH pertinent data on properties, grades, and packaging of General Chemical products . . . advise on materials and methods for handling and storing them . . . consult on their applications to your operations,..and work with you in the development of special chemicals to meet your individual requirements.

When "extra hands" such as these can help you, just phone or write to the nearest General Chemical Company Sales and Technical Service Office listed below.

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40 RECTOR STREET, NEW YORK 6, N. Y.

BASIC CHEMICALS
GENERAL CHEMICAL COMPANY
FOR AMERICAN INDUSTRY

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Cast Bronze Bearings

● At the present time you can secure *all* your requirements in cast bronze bearings and bushings . . . *without delay*. This includes a size range up to four and one half inches inside diameter . . . any outside diameter . . . and lengths to thirteen inches.

New and enlarged facilities, more advanced methods and the return of skilled veterans makes it possible for us to fill your needs promptly, in any alloy, fully machined to precise measurements and tolerances. Send your prints in now . . . or call your local Johnson Bronze Representative.

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The MOST COMPLETE SLEEVE BEARING SERVICE in the WORLD

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Advertisement

OCTOBER, 1946

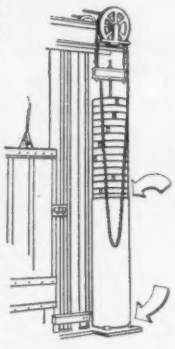
R-S FURNACE FACTS

ISSUED MONTHLY BY R-S PRODUCTS CORPORATION, PHILADELPHIA 44, PA., FOR THOSE CONCERNED WITH QUALITY HEATING OF METALS

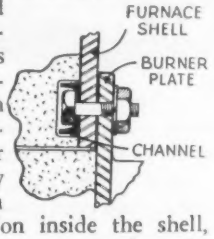
Furnaces Designed for the Men Who Run Them... as well as for the Product and the Treatment

Any *good* furnace handles the work surely, holds its temperature on the nose, and keeps up with production rates. But a *fine* furnace does more. A *fine* furnace takes into account the man who runs it. R-S has made *fine* furnaces for 38 years.

Take the matter of workmen's toes smashed beneath improperly guarded door-counterweights—or the matter of counterweight guards which become waste-baskets for lunch-pail refuse. R-S intentionally plans every guard sufficiently high and close-fitting to discourage its use as a receptacle—but never tries to save a foolish penny by omitting it.



Then there's the business of mounting burner plates. Heads of bolts which lie between furnace shells and refractory linings will work loose and spin under the wrench, unless restrained. On the other hand, welded studs make replacement hard if threads are stripped or damaged. R-S has been using a simple ingenuity to answer the enigma for many years. It welds a short channel section inside the shell, just large enough to accommodate the bolt head across its flats. The bolt is free, but it can't turn.



Now let's suppose you're a car-hearth or kiln-type furnace user. That means a sand seal—made by the average furnace builder of unyielding angle-iron or cast webs. Think of what could happen when work-pieces or tools tumble into such a seal and jam it! R-S outguesses trouble by making the male web of any sand seal thin enough (16 gauge) to "give" in an emergency—to allow cars to be drawn without furnace shut-down.

And finally, what about those leaks through peep holes, which keep furnace men busy shaving brick plugs and burning their fingers? R-S thoughtfulness of detail calls for free-acting covers which fall shut by gravity, and have opening-ears you can engage with anything from a lead pencil up.

Think of the men who run your furnaces the next time you plan a new one.

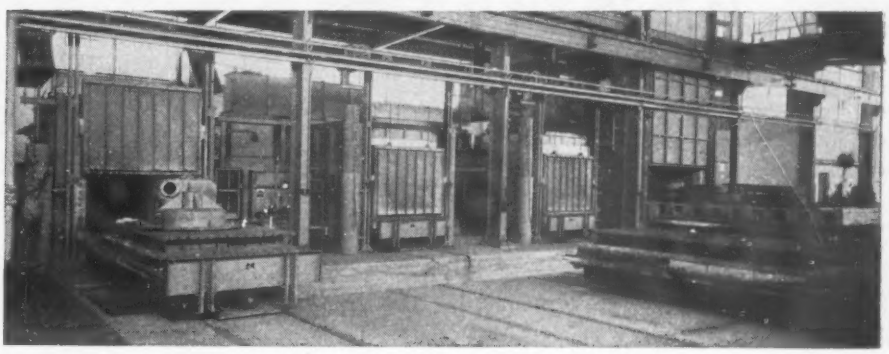
LAMENT IN LIMERICK

There was a heat treater from Wheeling
Who had a peculiar feeling.
He broke a prime rule,
Shut off air before fuel,
And his furnace went up through the ceiling.

•

P.S. Had it been an R-S furnace (always equipped with safety shut-off valves) the last line would read differently.

Furnace Family — for a Foundry



This battery of four R-S furnaces at General Metals Co. (Oakland, California) is an excellent example of convenience and flexibility in heat treating steel castings. One furnace (right) is extra-big—for the huge work and the larger charges. It goes to 2000°F. One furnace (second from left) is of the convection type, for all operations from 600 to 1250°F. Its external heater may be seen behind the column at the left of the furnace. The other two units are direct fired for work from 1200 up to 2000°F.

Note also the transfer car pit, the craneway planning, and the direct motor drive on the transfer car, the furnace cars and the large furnace door. Firing in all cases is with combination oil and gas burners, to take advantage of seasonal gas rates and favorable and unfavorable oil supply situations.

Here is a heat treat department wisely designed for adaptability to the fortunes and fluctuations of the business it serves.

J. H. Sipchen Heads New R-S Sales Group in Chicago

Welcomed this summer to the field sales and engineering family of the R-S Furnace Division was J. H. Sipchen Co., who will service forging, foundry, steel-mill and heat-treating users of furnaces in Illinois, Wisconsin, Lake County (Indiana), and the Tri-cities. With Sipchen, at 549 N. Washington Boulevard, Chicago 6 (phone—Randolph 0709), will be Paul Miller, erstwhile of the W.P.B.

Known for 20 years throughout mid-west heavy industry, Sipchen's more recent affiliations have been V.P. and Gen'l. Mgr. of Hannifin Manufacturing Co., Asst. to Pres. of Anker-Holth, and V.P. of Manufacturer's Equipment Co. Possibly his best known current work is in behalf of Erie Foundry Co., steam and board drop hammers, trimming presses and hydraulic presses. JMLeoPK-1

ONLY ALL OUT EFFORT can help. If you want steel to make your tomorrow's products, heed this appeal for your own sake, as well as for the reconversion program that affects us all! Only prompt action of *EVERY* steel user *NOW*, in shipping *EVERY* single pound of steel scrap back to the mills can prevent more mills from closing down or seriously curtailing their steel production in the face of already excessive demand over supply!

For every ton of new steel needed tomorrow, approximately one-half ton of steel scrap *MUST BE* available today to make it. By checking through your plant and scrap yard now, you may be surprised how many jigs, fixtures, tools and other equipment of iron and steel, beyond rework or repair, can be turned in at this very time when needed the most. *ONLY ALL OUT EFFORT* of ALL concerned will do any good. *TURN IN YOUR SCRAP today!*

A COOPERATIVE CONTRIBUTION IN BEHALF OF THIS NATIONAL EMERGENCY BY

THE STANDARD TUBE CO.
Detroit 3, Michigan
Welded Tubing
Steel Forgings
STANDARDIZE with "STANDARD" — It Pays

No Flaking - No Chipping - No Peeling

when you use Anti-Corrosive IRIDITE as a Paint Base

Tests by several leading companies show that IRIDITE provides a firm base for paint and clear lacquer . . . as well as a corrosion-licking, protective finish . . . on zinc die cast, zinc plated, galvanized and cadmium plated products. IRIDITE keeps the zinc from fouling the paint . . . prevents formation of the soapy, chalky underlying film that destroys adhesion. IRIDITED products take paint readily . . . hold it permanently . . . without flaking, chipping or peeling!

LICKS CORROSION, TOO!

Moreover, IRIDITE is widely used as a final protective finish . . . on zinc, cadmium, galvanizing. A quick IRIDITE dip balks corrosion while adding eye-appeal to your products . . . since it is available in black, blue, green, red, bronze, olive drab and transparent IRIDITE bright. And to cut costs, use IRIDITE in combination with zinc plating to replace more expensive materials.

FAST APPLICATION!

Whether you use IRIDITE as a paint base or as a anti-corrosion finish . . . it's easy to apply. Simply immerse your product in an IRIDITE solution . . . manually or automatically . . . on racks or in bulk . . . for 15 to 60 seconds . . . at normal shop temperatures. Your products keep moving along at automatic production line speed . . . and they are dried in a few seconds for immediate painting or handling.

Test IRIDITE as a paint base in your own plant, under your own conditions. Check it as a final protective finish with our FREE TEST PANEL . . . half IRIDITED, half unprotected. Send for your panel today. Rheem Research Products, Inc., 110 Chemical Building, 4004 E. Monument Street, Baltimore 5, Md.

IRIDITE TEST-imonials

"We have nothing but satisfactory reports on the parts that were Iridite treated on our two body valves."

EDWARD B. LOCKWOOD, *Vice President*
Streamaster Shower Corporation
New York, N. Y.

See how IRIDITE fits into your production. Send for FREE TEST PANEL . . . and subject it to the same corroding conditions your products must meet. Write today.

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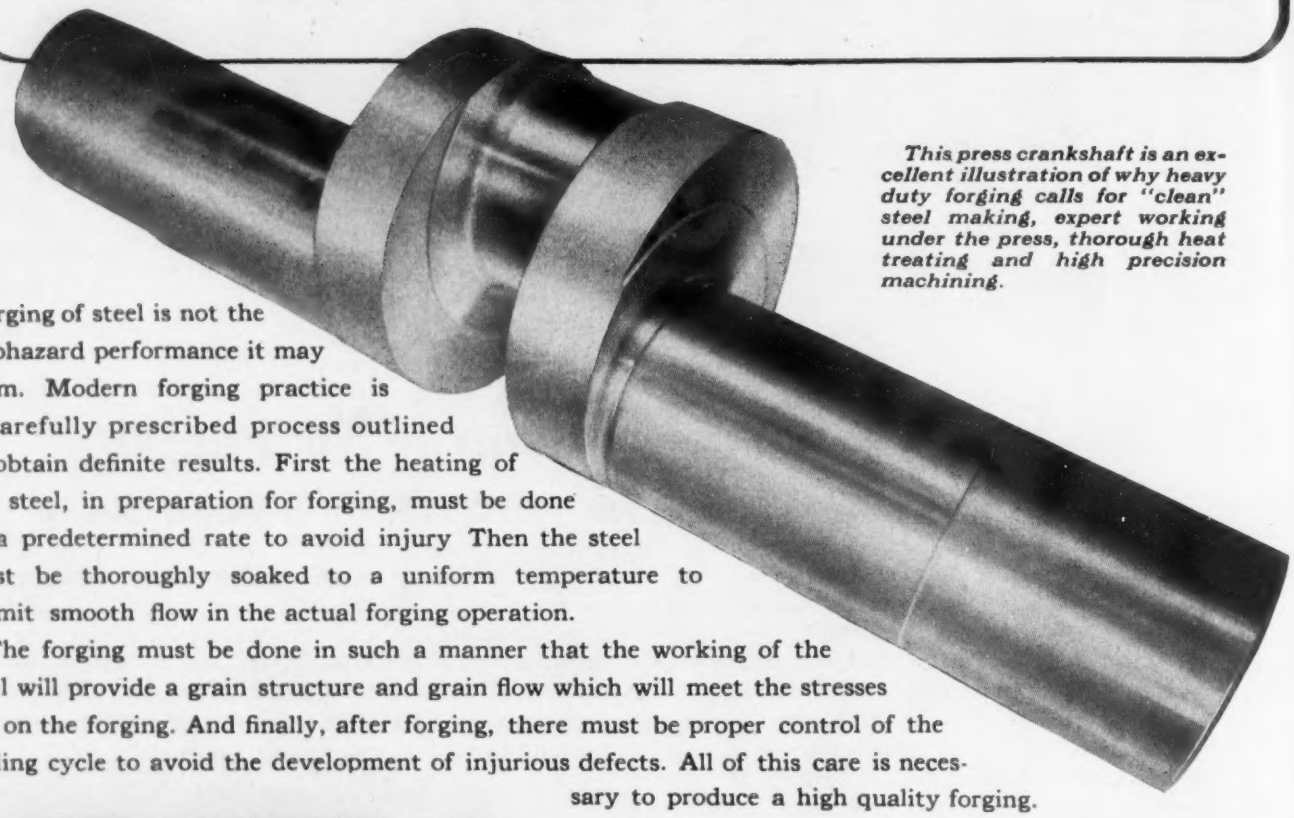
Reg. U. S. Pat. Off.

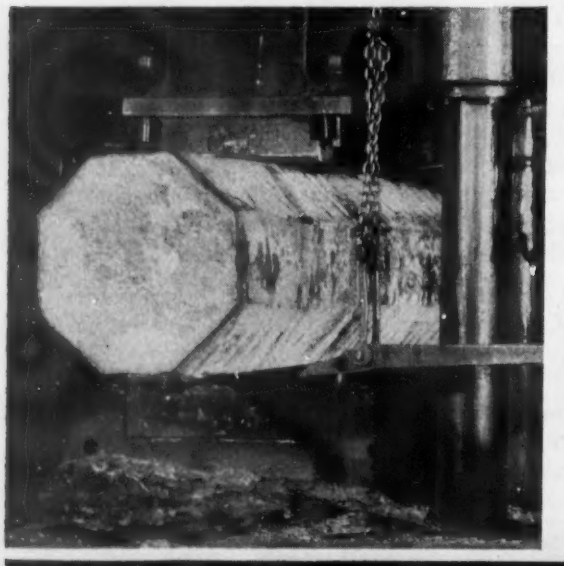
WHAT ABOUT THE *FORGESMITHING* IN THE STEEL *FORGINGS* YOU BUY?



This press crankshaft is an excellent illustration of why heavy duty forging calls for "clean" steel making, expert working under the press, thorough heat treating and high precision machining.

Forging of steel is not the haphazard performance it may seem. Modern forging practice is a carefully prescribed process outlined to obtain definite results. First the heating of the steel, in preparation for forging, must be done at a predetermined rate to avoid injury Then the steel must be thoroughly soaked to a uniform temperature to permit smooth flow in the actual forging operation.

The forging must be done in such a manner that the working of the steel will provide a grain structure and grain flow which will meet the stresses put on the forging. And finally, after forging, there must be proper control of the cooling cycle to avoid the development of injurious defects. All of this care is necessary to produce a high quality forging.



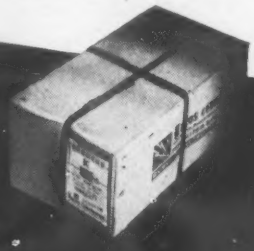
NATIONAL FORGING IS A SKILL OF THIRTY YEARS STANDING

At National every forging presents its own challenge to correct forgesmithing. That is why National Forge is so meticulous in setting up the prescribed procedure which it uses in heating the steel, forging and cooling. It's the long acquired forging "know how" that makes the difference in National Forgings—a difference you should know about now if you have steel forgings to buy.

NATIONAL FORGE & ORDNANCE COMPANY

IRVINE, WARREN COUNTY, PENNSYLVANIA

If you're welding alloys . . . Consult Your Arcos Distributor



- He is conveniently located and carries well balanced stocks.
- His experience in welding alloys with Arcos electrodes is of real value to you.
- He has ready access to the facilities of the Arcos Research and Engineering Laboratories.
- For out-of-the-ordinary welding problems, he has the Arcos field engineering staff to call on.
- Backing up his entire organization is the long established reputation of Arcos Electrodes — 48 different analyses in all popular sizes for welding chrome-nickel, and straight chrome stainless steels, high tensile steels, bronzes, cupro nickel, monel, and nickel.

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Profit by the right combination—Arcos dependable weld metal, serviced and delivered to you by a competent organization.

ARCOS

ARCOS CORPORATION • 318 GULF BUILDING, PHILA. 2, PA.

V-Belt
In Sheave
Clearly, it's the sides of a V-Belt that do all the gripping on the pulley and get all the wear against the sheave-groove wall. That's why longer life for the sides means longer life for the belt!
THE
CONCAVE SIDE
A
GATES
PATENT

The SIDEWALL of Your V-Belt does MORE Work NOW than ever before!

--that's why the CONCAVE SIDE has become Even MORE IMPORTANT!

The moment you think about it you realize, of course, that the *sidewall* is the part of a V-Belt that really gets the *wear*.

It's the sidewall that has to grip the pulley. It has to pick up all the power from the driver pulley, transmit that power to the tension member and then deliver to the driven pulley all the power that pulley ever receives.

That is the perfectly natural reason why you have always noticed that the sidewall of the *ordinary* V-Belt is the part that wears out first. Clearly, anything that lengthens the life of the sidewall will lengthen the life of the belt.

The simple diagrams on the right show clearly why the ordinary, *straight-sided* V-Belt gets excessive wear along the *middle* of the *sides*. They show also why the Patented Concave Side *greatly reduces* sidewall wear in Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longer service than any straight-sided V-Belts can possibly give.

Straight Sided V-Belt — FIG. 1

How Straight Sided V-Belt Bulges When Bending Around Its Pulley — FIG. 1A

You can actually feel the bulging of a straight-sided V-Belt by holding the sides between your finger and thumb and then bending the belt. Naturally, this bulging produces excessive wear along the middle of the sidewall as indicated by arrows.

Gates V-Belt with Patented Concave Sidewall — FIG. 2

Showing How Concave Side of Gates V-Belt Straightens to Make Perfect Fit in Sheave Groove When Belt Is Bending Over Pulley — FIG. 2A

No Bulging against the sides of the sheave groove means that sidewall wear is evenly distributed over the full width of the sidewall—and that means much longer life for the belt!

4610

Stronger Tension Members in Today's Belts Put Even GREATER LOAD on SIDEWALLS!

Now that Gates *Specialized* Research has resulted in V-Belts having much stronger tension members—tension members of Rayon Cords and Flexible Steel Cables, among others—the sidewall of the belt is often called upon to transmit to the pulley much heavier loads. Naturally, with heavier loading on the sidewall the life-prolonging Concave Side is more important today than ever before!

Gates

THE MARK OF SPECIALIZED RESEARCH

THE GATES RUBBER COMPANY

DENVER, U. S. A. — World's Largest Makers of V-Belts

GATES VULCO ROPE DRIVES

Engineering Offices and Jobber Stocks **IN ALL INDUSTRIAL CENTERS** of the U. S. and 71 Foreign Countries

SPECIFY VANCORAM FERRO VANADIUM

FOR HIGHEST QUALITY ALLOY STEELS

Whether you produce wrought constructional steels, alloy steel castings, high speed tool steels or special-purpose steels, there is a grade of Vancoram Ferro Vanadium designed to meet your requirements. Our modern quality-control methods result in a higher quality product of dependable uniformity—thus assuring the steelmaker closer control and unexcelled microstructure and physical properties.

To cover the more common steelmaking needs we supply:

	Grade A (Open Hearth)	Grade B (Crucible)	Grade C (Primos)
Vanadium	35 to 40%	35 to 45%	35 to 45%
Silicon	12% max.	3.5% max.	1.25% max.
Carbon	3.5% max.	0.5% max.	0.20% max.

Special grades, containing up to 80% Vanadium, and Vanadium Metals, containing 90% and 95% Vanadium, are also available.

All grades are carried in stock and can be supplied in large lumps, or crushed or ground to any desired size. Our metallurgists will gladly discuss the application of Vancoram Ferro Vanadium in terms of your requirements.

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VANADIUM CORPORATION OF AMERICA

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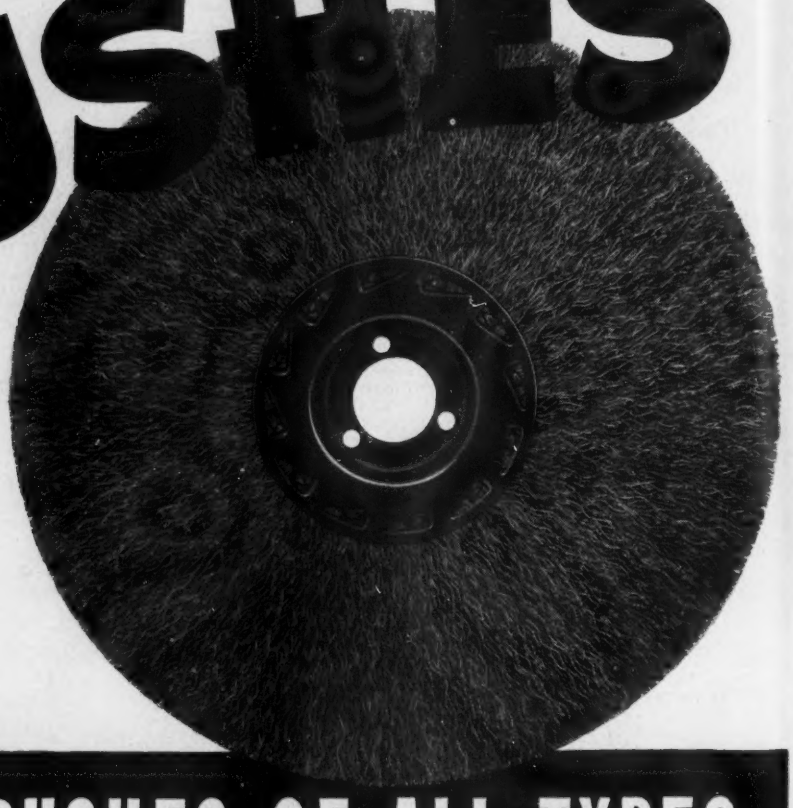
"PERFECT BALANCE" ROTARY BRUSHES

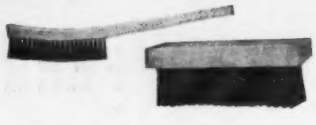


Carefully controlled distribution of the brushing stock gives perfect balance and maximum efficiency to these power driven rotary brushes. Wire or fiber. May be used as individual sections or in assemblies.

INDUSTRIAL BRUSHES OF ALL TYPES FOR BETTER PRODUCTION

SPIRAL WOUND

These brushes are made with various fills, such as nickel-silver wire, tampico or horsehair — each engineered to a specific purpose.



UNI-FILL

These scratch brushes are uniformly filled. They are trimmed with a "bite" to give the best performance obtainable with hand scratch brushes.

RED CENTER

Red Center Wheel brushes made in various diameters and degrees of stiffness for many different applications are sturdy in construction and in perfect balance.

Brush Division
PITTSBURGH PLATE GLASS COMPANY

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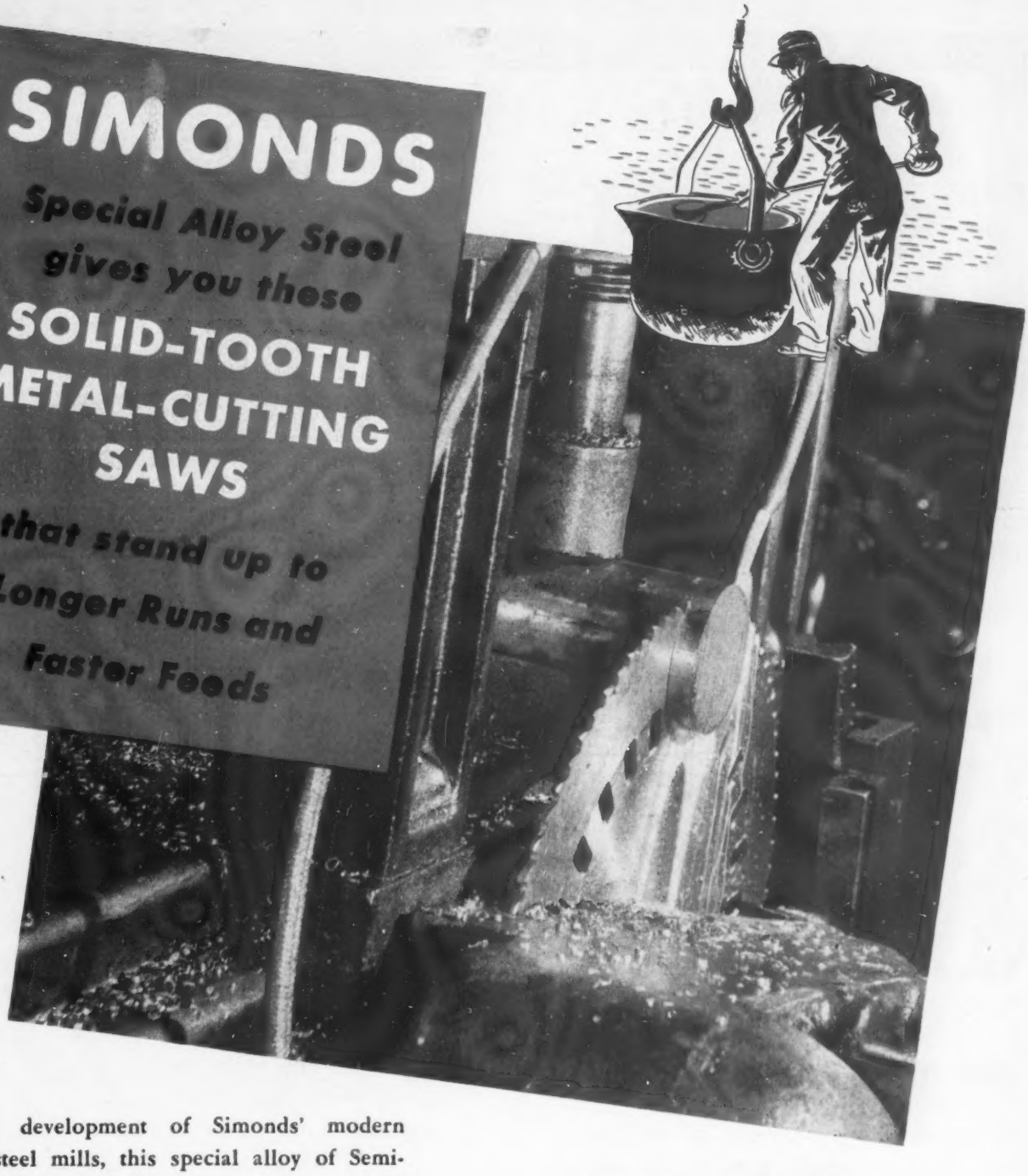
Special Alloy Steel gives you these SOLID-TOOTH METAL-CUTTING SAWS that stand up to Longer Runs and Faster Feeds



Exclusive development of Simonds' modern electric steel mills, this special alloy of Semi-High-Speed Steel gives you longer runs at faster feeds . . . on a wide range of work from mild steel and cold-rolled shafting to high-speed and chrome nickel steels.

Another exclusive Simonds process is the method of grinding side-clearance . . . a method which produces Solid Circular Saws with uniformly accurate rim-thickness. Then the saws are finished by still another special process which leaves no hammer-marks on the plate.

These exclusive advantages are *your triple warranty* of longer life and plus-performance in Simonds Solid-Tooth Circular Metal-Cutting Saws. Order them from your Industrial Supply Distributor or from the nearest Simonds office.

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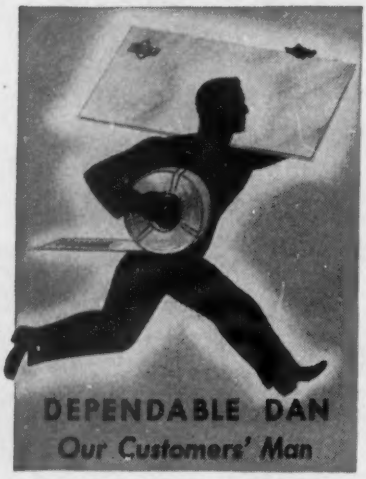

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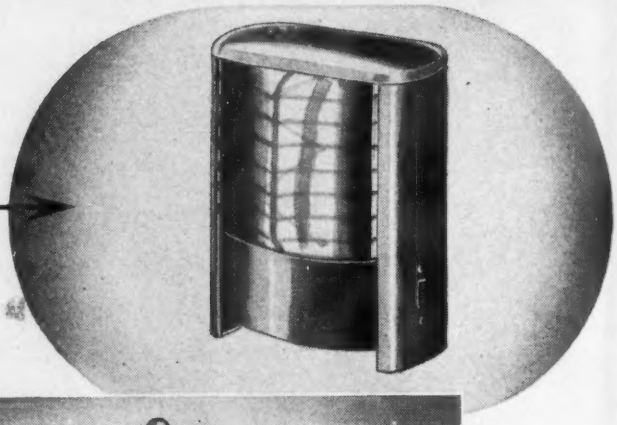
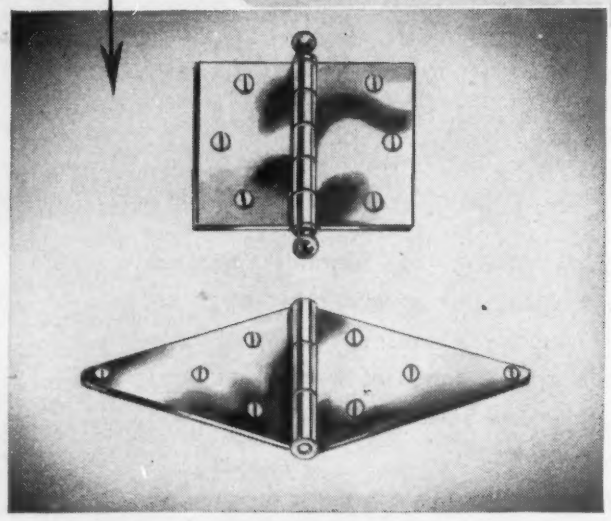
JOB-FITTED STEEL

The Invisible Mark of Quality in Your Product . . .

FROM *Heaters* TO *Hinges*





Sheet and Strip Steel . . . JOB FITTED TO YOUR PRODUCT

When Reliance Job-Fitted Steel goes into your product, it gives up its own identity but in doing so, it imparts strength, beauty, serviceability and endurance. It makes for speedy, smooth production at low cost.

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Detroit Steel Corporation

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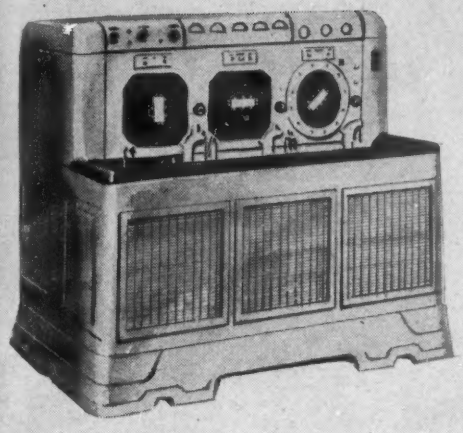
—TOCCO—
AT REASONABLE PRICES



Here is your chance to use the modern method of heat-treating metals. This famous make, Tocco, is like a machine tool. The process saves time . . . metals are hardened in seconds. The compact units fit easily into the production line without the need for special space. Moreover, you'll find that *continuous operation* is a great help in cutting costs—boosting production.

Best of all, you can buy these high production units at attractive prices through War Assets Administration. They're price-tagged for quick sale.

SOME OF THE *Advantages* OF INDUCTION HARDENING

Faster . . . heat is developed *within* the workpiece.
Saves metal . . . reduces metal losses from scaling.
Control . . . heating can be controlled to any length or portion.
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Versatile

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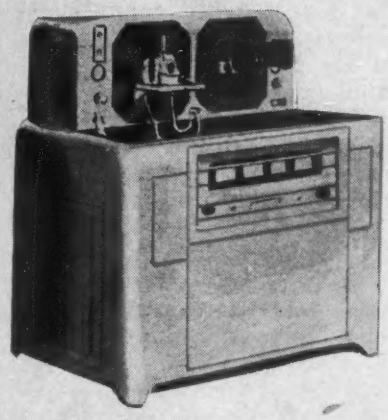

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Yes, I'd like free information on the cost and location of Tocco Induction Hardeners. I'm interested in equipment of the following KW rating!

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FIRM.....

ADDRESS.....

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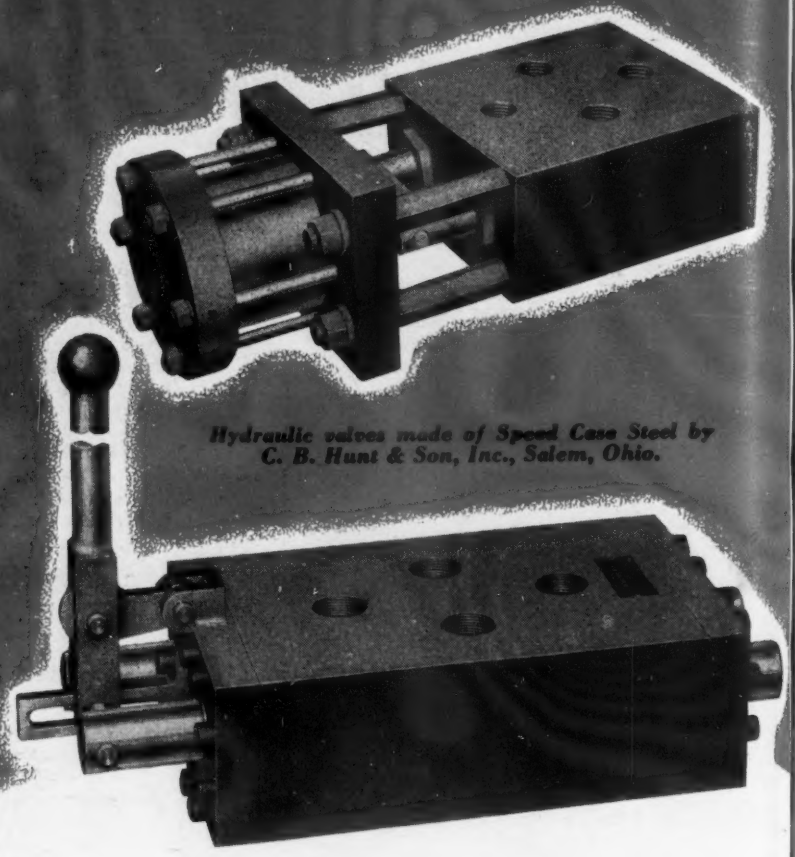

Hydraulic valves made of Speed Case Steel by C. B. Hunt & Son, Inc., Salem, Ohio.

Speed Case and *Speed Treat* open hearth steel plates give you

- Faster machining
- Smoother, higher finish
- Increased tool life
- Minimum warpage in carburization or heat treating
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If you make parts from steel plates where machining costs run high, this story of *Speed Case* Open Hearth Low Carbon Steel will interest you.

C. B. Hunt & Son, Inc., of Salem, Ohio, manufacture valves for hydraulic and pneumatic systems. The particular valves illustrated are for pressures up to 5,000 PSI. Of necessity, the valve blocks must be machined from solid steel plate and considerable internal machine work done. *Speed Case* Steel is used for these valves since it meets every metallurgical specification . . . and gives the important plus-factor of easy, free machinability.

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AND
SPEED TREAT
MEDIUM CARBON OPEN HEARTH FREE MACHINING
STEEL
PLATES

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W. J. HOLLIDAY & CO.

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HAMMOND, INDIANA

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ATLANTIC CITY

NOVEMBER 18-22, 1946

LOOK TO THE *METAL SHOW* FOR PRODUCTION IDEAS

Every metal man can be a seer and get real production ideas just as quickly and easily as looking into a crystal ball by visiting the 28th annual National Metal Congress and Exposition, Atlantic City Municipal Auditorium, Nov. 18 to 22. This big event concentrates the latest ideas of more than 300 manufacturers in operating displays at the Exposition . . . concentrates the research developments of industry in fast-moving technical sessions sponsored by four great national societies.

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More than 100 research papers on many metal topics will be presented by outstanding metal industry experts during sessions of the Metal Congress. You will find production ideas at all of these meetings and in conversations with other metal men who will attend this annual event.

Show time is close at hand — November 18 - 22, Monday thru Friday. Make your plans to attend right away — write for hotel accommodations to the Housing Bureau, National Metal Congress and Exposition, 16 Central Pier, Atlantic City.

ATTENTION MANUFACTURERS —

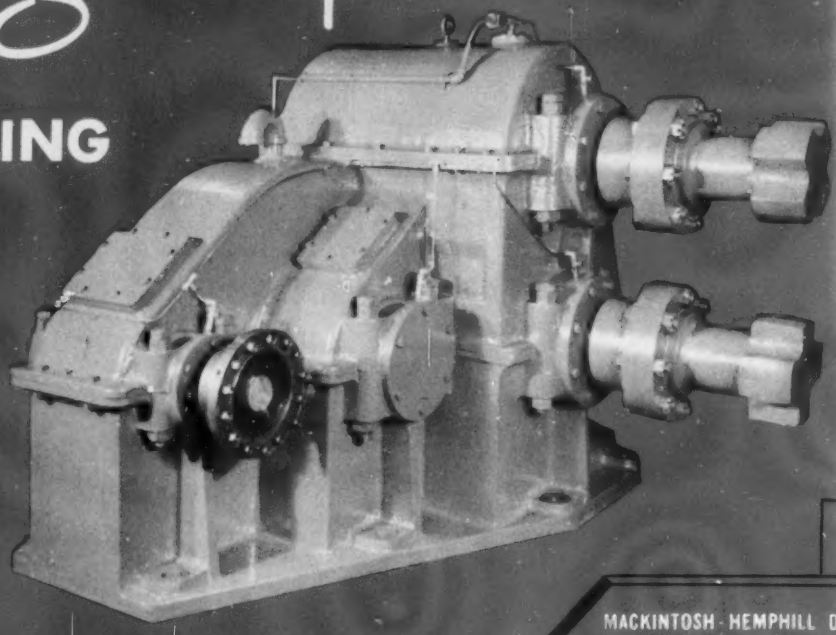
A few good exhibit locations are still available. If you have a product to introduce — a metal industry market to cultivate, wire or phone for space details to W. H. Eisenman, 7301 Euclid Avenue, Cleveland — Phone Endicott 1910.

NATIONAL METAL CONGRESS AND EXPOSITION

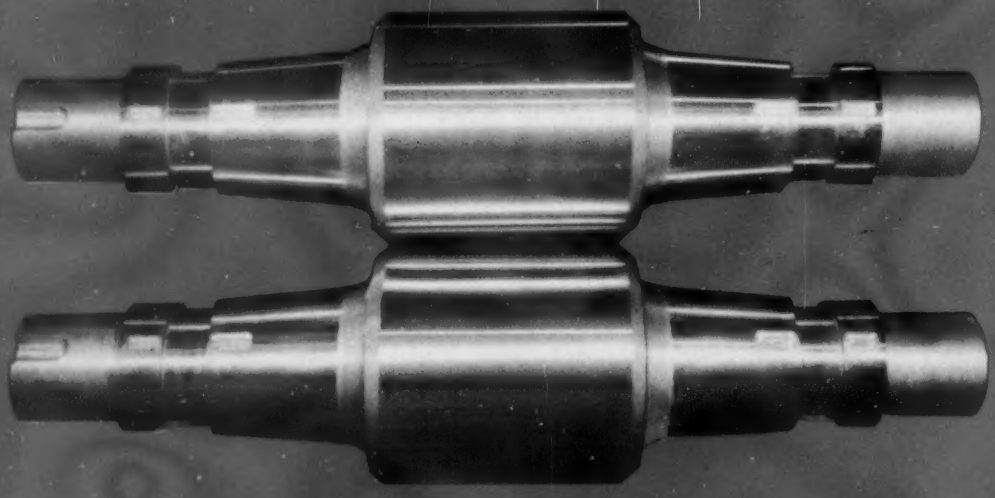
Sponsored by the American Society for Metals in cooperation with

The American Welding Society . . . The Iron and Steel and Institute of Metals Divisions of the American Institute of Mining and Metallurgical Engineers . . . American Industrial Radium and X-Ray Society.

8 guideposts to PRODUCTIONEERING



MACKINTOSH-HEMPHILL DRIVES transmit power for industry's metal rolling mills.



ROLLS WITH THE RED WABBLERS will make short work of your production rolling operations.

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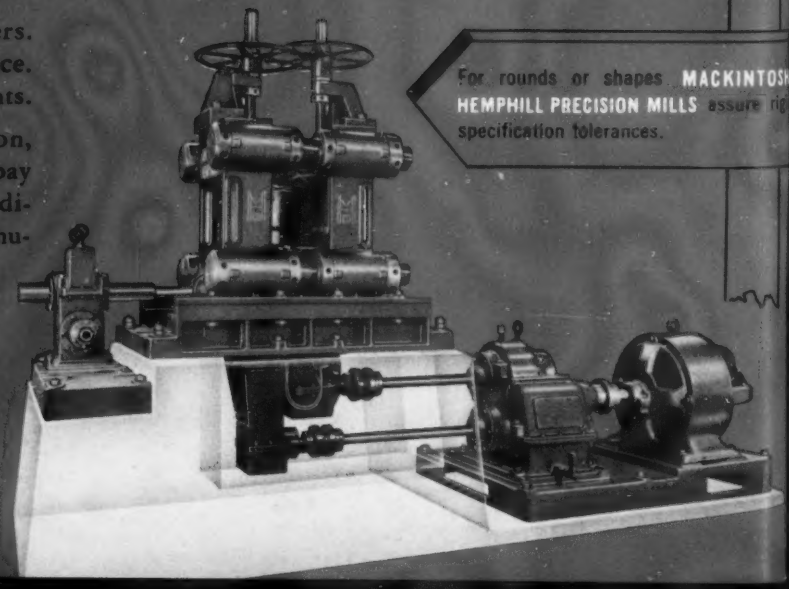
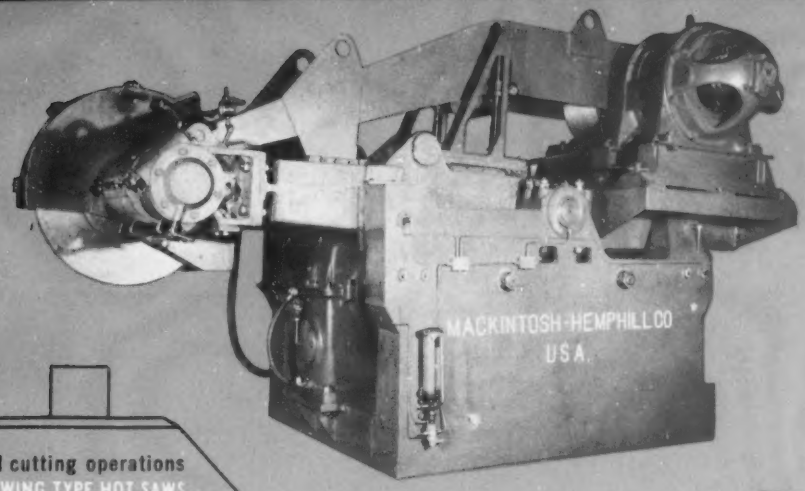
- Metallurgists trained in metal mill practice.
- Two completely manned manufacturing plants.

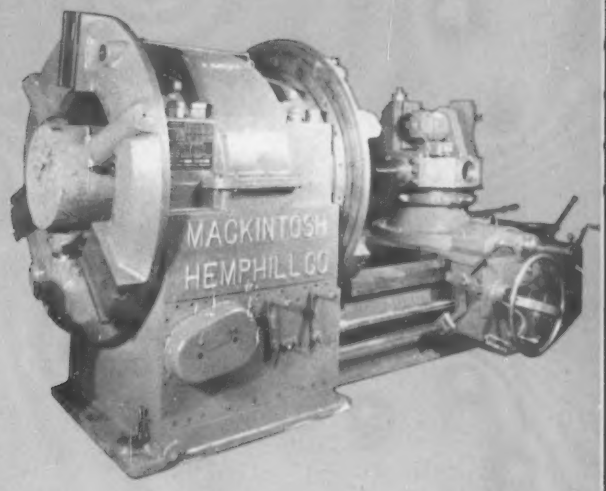
In the present-day struggle with competition, higher costs, and lost productive time it will pay to keep your eye on what's new in the widely diversified types of production machinery manufactured by MACKINTOSH-HEMPHILL.



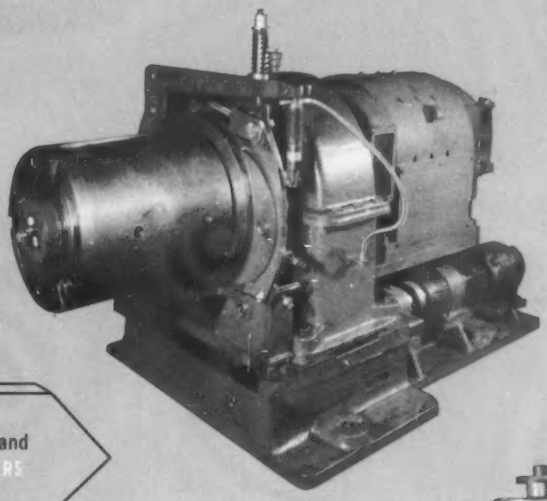
For rounds or shapes MACKINTOSH-HEMPHILL PRECISION MILLS assure rig specification tolerances.



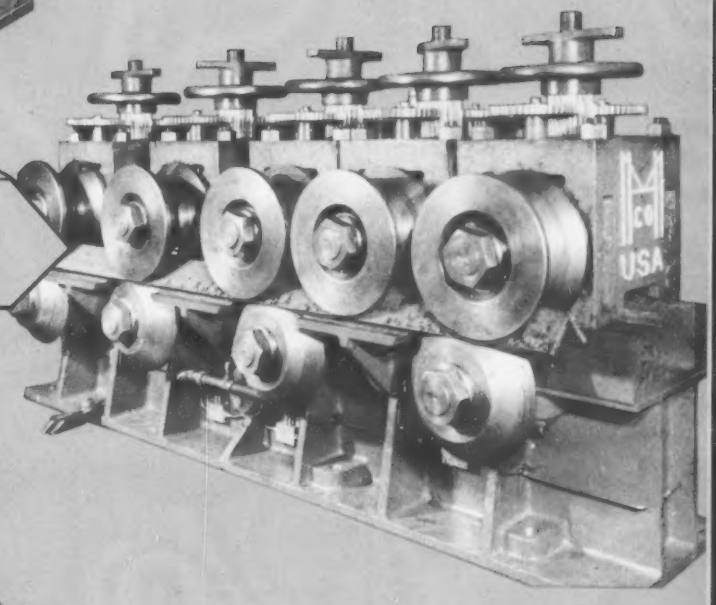
For high-speed cutting operations there are M-H SWING TYPE HOT SAWS and many types of shears.



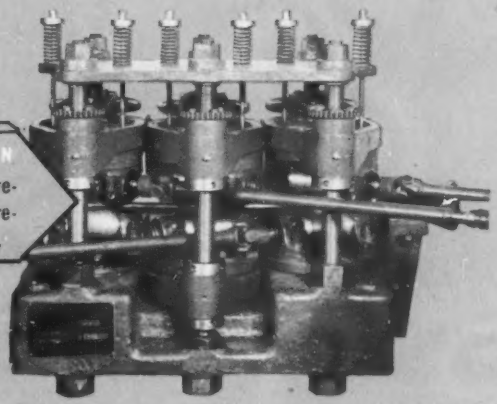
M-H HOLLOW-SPINDLE TURRET LATHES together with heavy-duty lathes of many types, fulfill many special productioneering requirements.



For all types of metals, in all widths and coil weights, there are M-H STRIP COILERS



There are M-H ANGLE AND SHAPE STRAIGHTENERS too, in the M-H catalog of metal straightening equipment.



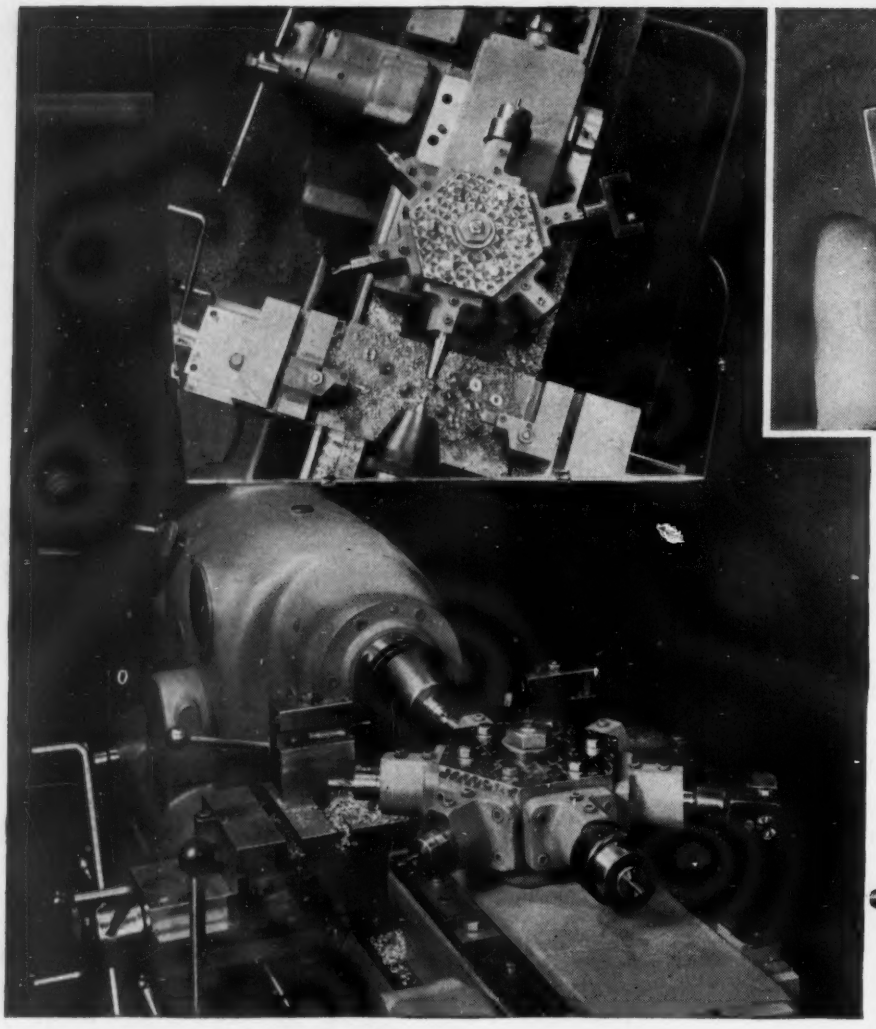
MACKINTOSH-ABRAMSEN STRAIGHTENERS leave no score-marks on finished products, require minimum setting-up time.

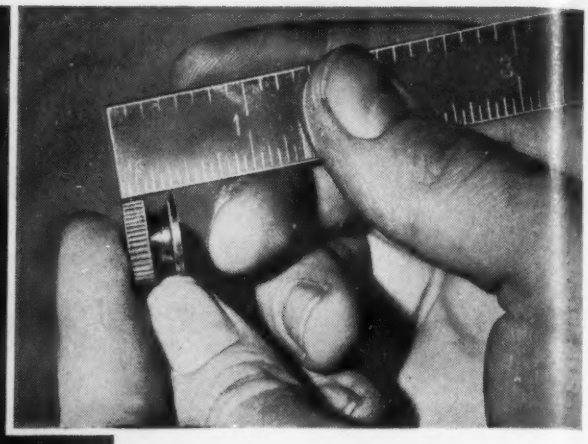
MACKINTOSH-HEMPHILL CO.

PITTSBURGH · MIDLAND, PA.

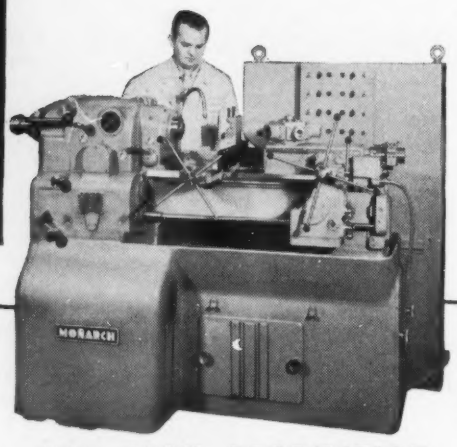
Makers of the rolls with the red wabblers

36.6 SECONDS FROM BAR TO FINISHED PART





Part—Knurled Clamp Nut
Material—Brass, 5/8" Bar Stock
Preselected Spindle Speeds—5
Time Per Piece—36.6 Seconds
Setup Time—43 Minutes



Here's another outstanding case of Speedi-Matic savings on repetitive manufacturing—knurled nuts rolling out at the rate of almost 100 an hour!

Each nut requires six speed changes per cycle. Time: 36.6 seconds! Small wonder that users everywhere are calling the Speedi-Matic "the world's fastest hand screw machine!"

The Monarch Mirror shows the reflection of this efficient production setup: 7 operations, using 5 positions on the hexagon turret, plus the front and rear cut-off slides. The tooling is typical of the class of job on which you can save time and money with a Speedi-Matic. It combines maximum production with extreme accuracy on lots of 25 to 500 or more. Get the full facts *now*, while deliveries are still favorable.

THE MONARCH MACHINE TOOL CO.
Sidney, Ohio

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TURNING MACHINES

FOR PEAK PRODUCTION AT A PROFIT
SPECIFY SPEEDI-MATIC

Here's what you get:

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- Feeds from .0005" to .016" per revolution.
- Power feed ram-type turret.
- Spring-return hand-operated cut-off slide.
- Air-fed pusher-type collet attachment.
- Collet chuck capacity—⅞".

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The Magazine of Metalworking and Metalproducing

VOL. 119, NO. 15 OCTOBER 7, 1946

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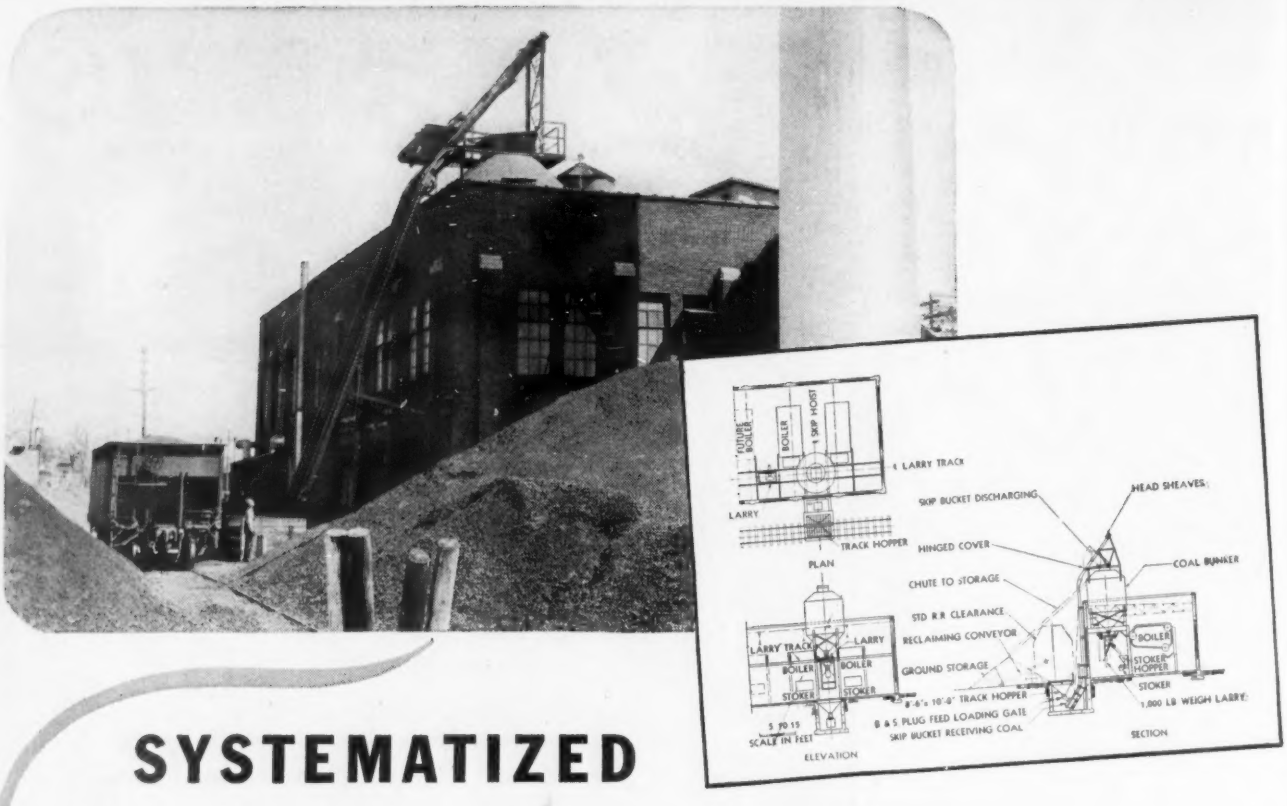

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COAL HANDLING FOR CENTRAL STATIONS AND INDUSTRIAL BOILER PLANTS

As the EDITOR VIEWS the NEWS

Tale of Two Cities

As this is written, proud Pittsburgh—leading iron and steel center of the world's greatest industrial nation—is desolate, defenseless and despondent because the demands of selfish minorities have been given preference over the rights of the public.

Management and employees of a power company are at loggerheads. Members of other unions refuse to cross power employee picket lines. Hotel employees are on strike. As a result of these and other work stoppages, residents in many sections of Pittsburgh are deprived of public transportation, restricted to one lighted lamp per home, urged to use water sparingly and inconvenienced in numerous other ways. Many industrial plants are at a standstill. Each large office building in the Golden Triangle operates a single elevator sparingly. Restrictions have been placed upon the flushing of toilets. Federal, state and local governments seem to be utterly helpless to do anything to remedy the situation. Pittsburgh today is in a state of near anarchy.

In this writer's experience, the city most closely resembling Pittsburgh in its present predicament is Mukden, Manchuria. Mukden, with a postwar swollen population of more than 3,000,000 has no piped water, no street car transportation and only a few feeble electric lights. In its once pretentious Shenyang Railway Hotel, elevators run only occasionally, electric lights glow dimly spasmodically and toilets are flushed infrequently. In this case the trouble is two-fold. The Soviets during the period from September through November last year stripped Manchuria of much of its industrial and power generating equipment. Since then the Chinese Communist Army has cut power lines, blown up bridges and otherwise slowed repair of the damage caused by the Russians.

As a result Mukden and Pittsburgh today share a common fate, but with one important difference. The Chinese in Manchuria were confronted with a menace from outside the nation—a stripping of facilities by a foreign power beyond their own control. In the Pittsburgh case, federal, state and local authorities are not plagued by outside influences. Every factor in the situation is well within their control, yet they seem to be powerless to act for the people.

Is this not a sad commentary upon our nation? Is it not an ironical reflection upon our Wagner act—that much glorified Magna Charta that was to insure industrial peace? Is it not a disgraceful spectacle to present to a war-sick world which is looking to the United States for leadership and guidance toward peace and stability?

STEEL
October 7, 1946

MESABI'S TACONITE: A highlight of the annual convention of the Association of Iron & Steel Engineers in Cleveland last week was a clear-cut analysis of the Lake Superior iron ore situation by E. W. Davis of the University of Minnesota.

He pointed out that more than a billion tons of ore averaging 51.8 per cent iron have been taken from the Mesabi range during the last half century. Another billion tons of like quality remain. Assuming a consumption of 35 million tons annually, this reserve would last 30 years. If annual consumption should be 70 million tons, as it was in 1942, the high-grade Mesabi ore would be depleted in approximately 15 years.

The obvious way to prolong the life of the Mesabi range is to utilize its tremendous supply of taconite. Mr. Davis believes that taconite concentrate can be produced at a cost only slightly higher than normal Lake Erie prices. Tests indicate that such ore can be smelted cheaper than present lake ores. Inasmuch as the higher cost of producing taconite concentrate may be offset by lower smelting costs,

(OVER)

the cost of producing pig iron should not be affected seriously.

If this vision of manufacturing high-grade ore from now worthless rock should materialize, the nation could draw a major portion of its iron ore requirements from Mesabi for another century or more. It is an exciting prospect! —p. 83

° ° °

"DOCTORED" STATISTICS: At no time in history have government statistics been criticized as severely as during the past decade. Labor unions questioned the accuracy of the Department of Labor cost of living index. Almost everybody except a few labor leaders and leftist new dealers took violent exception to Henry Wallace's Department of Commerce fake statement that wages could be increased sharply without increasing prices. Now, Andy Court, General Motors labor economist, takes issue with the Federal Reserve Board index of industrial production which sets July automobile output at 78 per cent above the 1935-39 average, whereas, according to orthodox arithmetic, production actually was down 10 per cent.

The trouble with government statistics under the present regime is that New Deal gremlins in various departments try to manipulate the figures to serve their ideological objectives. The sanctity of government statistics will not be restored until the routine activities of the executive branch of government are divorced from politics. —p. 95

° ° °

WORKING ELEPHANTS: Manufacturers at their wit's end as to how to obtain enough steel to keep their plants operating are prone to discount the effectiveness of the steel industry's stated steel ingot capacity of more than 90 million tons. They are inclined to subtract from this total liberal tonnages for ineffective bessemer and electric furnace capacity and for government-owned steelworks which may not get into private operations for years to come.

However, the record of these "white elephants" is not too discouraging. Geneva has gone to U. S. Steel, which has announced reassuring plans for its continued operation. Fontana, another facility born of wartime necessity, is booked months ahead. Republic Steel is highest bidder among five contestants for the $92 million government-owned plant at South Chicago.

One by one these larger plants are going to producers who are struggling hard to work off tremendous order backlogs. In time this may prove to be a welcome break for steel consumers.

—pp. 87, 100, 101

SIGNS OF THE TIMES: Last Tuesday at Detroit officials of Gray Marine Division of Continental Motors demonstrated test vessels propelled by high velocity water jets. The idea of hydro-jet propulsion in the marine field (p. 96)—still in the experimental stage—is similar in many respects to jet propulsion in the aircraft field. . . . Britain's labor government is modifying its plans for the steel industry. Instead of nationalizing iron and steel facilities, as it first contemplated doing, the government will set about acquiring a majority of shares in the principal companies (p. 91), thus concentrating voting power in the hands of directors who will be nominees of the government. . . . Production of truck-trailers in 1946 is expected to reach 60,000 units (p. 92), exceeding the highest previous output of civilian trailers of 41,869 in 1941 by a substantial margin. . . . U. S. Commercial Co., as agent for OMGUS (Office of Military Government, United States) in Berlin, has begun shipping German manufactures to the United States. Early consignments will consist of toys, Christmas tree ornaments, china, porcelain, earthenware, cameras, wine and optical goods. Objective is to help Germany to get onto a self-supporting basis (p. 88) and to pave way for German-American trade. . . . In spite of the numerous difficulties confronting business, 82,836 companies were incorporated in the first seven months of 1946. This represents an average of 11,834 new businesses per month (p. 176), as compared with a monthly average of only 5963 during the last half of 1945. . . . Recently a plane which ordinarily would have required a run of 2000 feet for takeoff was launched in 4 seconds after a run of only 340 feet with the aid of an "electropult" (p. 122), which is essentially a large electric motor laid out flat. Its track corresponds to the rotor of a conventional motor and the small shuttle car which traverses it acts as the stator. Designs are completed for an installation capable of launching the largest existing air liners with a takeoff of only 500 feet. . . . A British fabricator has been awarded a contract for 1200 to 1300 tons of structural steel (p. 91) to be used in rebuilding the famous House of Commons. . . . United States Steel's plate mill at Geneva, now rolling plate chiefly for large diameter pipe and tanks (p. 100) will be converted into a wide hot strip mill as soon as equipment can be obtained.

E. C. Shaner

EDITOR-IN-CHIEF

Meeting Steel Requirements

the Hard Way—

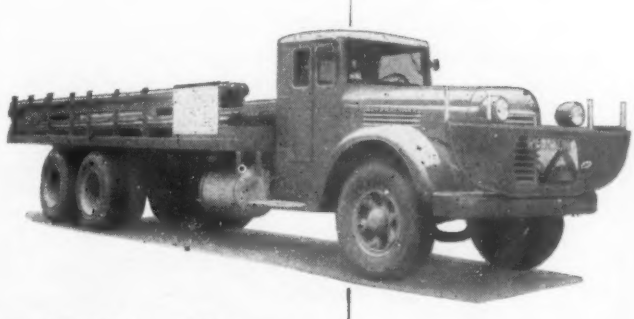
But Still Meeting Them!

A manufacturer of coal mining drills was desperate for 2½" x 2½" x ¼" square tubing needed for drill supports, on an order scheduled for shipment halfway around the world. The required size of tubing was nowhere available, but Ryerson Steel Service was equal to the occasion.

By forming two channels from ¼" plate and welding the channels together we were able to deliver several hundred pieces of the required tubing! While such an emergency measure is obviously not always practical, it did make it possible for the customer to complete his order and ship on schedule. And this is but one of numerous instances where Ryerson service has achieved the seemingly unachievable.

There are many requirements that we cannot handle today, but it is often surprising what can be done with the close cooperation of your nearby Ryerson plant. If needed steel is out of stock the Ryerson salesman will sometimes be able to suggest a practical alternate steel, or he may know a way in which flame cutting, forming or welding can serve to provide a workable substitute.

So we urge you to keep in touch with us. Our whole organization is doing everything within its power to help every customer get the steel he needs.



JOSEPH T. RYERSON & SON, Inc., Steel-Service Plants at: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston

RYERSON STEEL

The vast resources of the Inland Steel Company are important factors to volume users of steel.

Extensive mines and quarries...modern freighters...towering blast furnaces...the glowing open hearths and coke ovens... the powerful rolling mills, vibrant with action and life!

Activating these resources and modern facilities are Inland's experienced engineers and metallurgists applying their skills to every phase of development, production, and control...making certain that every ton of steel produced is worthy of the name...INLAND!

Yes, Inland has the resources to produce quality steel for you.

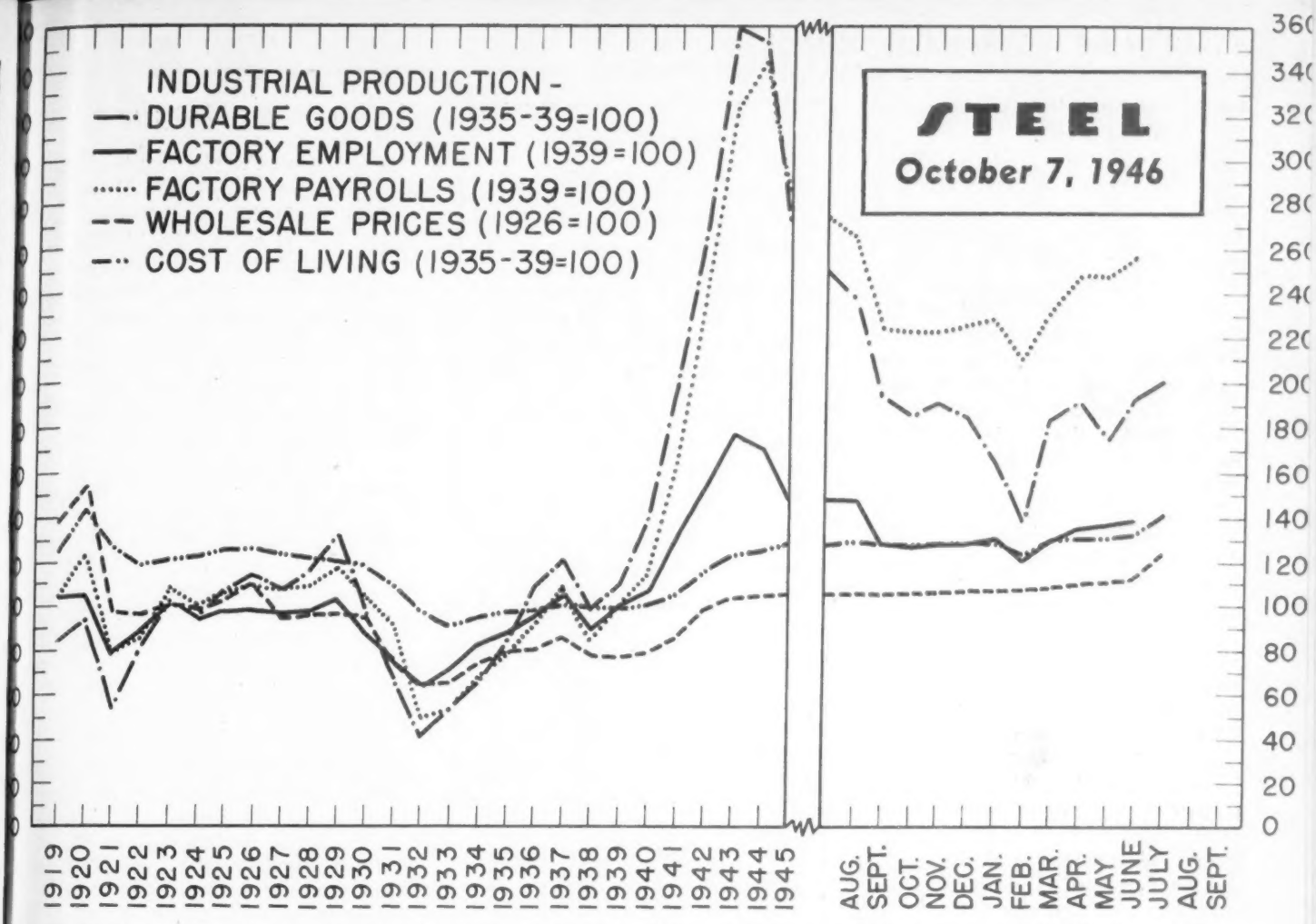
HELP! MORE SCRAP NEEDED!

Extra tons of scrap are needed to make the extra tons of steel for American industry. Please keep your scrap moving back to the mills.

INLAND STEEL

● Inland Steel Company, 38 South Dearborn Street, Chicago 3, Illinois. Sales Offices: Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Paul, St. Louis.

PRINCIPAL PRODUCTS: Bars • Structurals • Plates • Sheets • Strip • Tin Plate • Floor Plate • Piling • Reinforcing Bars • Rails • Track Accessories



Fluctuations of the primary economic indicators from the end of World War I to the present. Wholesale prices and cost of living indexes are relatively lower now than following the first war; payrolls and production are relatively higher

Will Pattern of 27 Years Ago Repeat?

Economic histories of 1919 and 1946 contain many parallels. Both were disappointing in volume of production. Both were beset with widespread labor strife, lowered worker productivity, rising costs and prices, shortages and unbalances of supply

By W. J. CAMPBELL
Associate Editor, STEEL

TURNING back the pages of economic history 27 years reveals some interesting parallels between then and now.

Fourteen months after the 1918 Armistice, this country's postwar record in recovery was disappointing and the future was uncertain. Many of the same shortages and unbalances in prices and supplies, comparable labor unrest, and widespread disappointments and fears existed.

The situation then was summed up by the *Iron Trade Review*, predecessor to STEEL, on Jan. 1, 1920: "For the United States the first year of reconstruction has fallen below expectations, gaged by business standards. The chief cause may be laid to labor disturbances and to labor inefficiency. The year's record of strikes and lost output has been appalling. . .

"Organized labor, radical in its autocracy, has sponsored acts and demands bordering on the revolutionary. Dangerous and fanciful doctrines looking to the upheaval of orderly society have been common in all countries.

"Commodity prices have continued their unbroken advance until they have borne heavily upon domestic life. A passion for reckless spending has seized upon all the peoples. Deep unrest has been widespread."

The similarities found in the two postwar pictures are sufficient to start analysts speculating on the probability of the 1919-22 pattern repeating itself. Especially since the stock market break last month, prognosticators have been hinting guardedly of a recession similar to that of 1921.

They also note certain basic differences between the situation in 1919 and the present, and many contend the present situation contains enough steam to carry along at a high rate, barring a new epidemic of major strikes and work stoppages.

One of the chief fears currently being expressed is that industry will be forced out of its markets by the large increases in labor and other costs forced upon it by the labor unions and the government.

Although little evidence of this is yet discernible, economic observers believe a continuation of the rising price trend will cut demand sharply and that today's scarcities may become tomorrow's surpluses almost overnight. They believe that a large number of potential buyers of automobiles, for example, are going to defer their purchases when they are asked to pay $1600-$1700 for a car that sold for $1100-$1200 before the war.

Such a move would find a parallel in April, 1920, when "Overall Clubs" were formed in many cities to combat the high and increasing cost of clothing. These were a manifestation of a buyers strike and within a few months clothing stores

were advertising "sales" at price reductions up to 30 per cent.

A. T. Colwell, vice president and director of engineering, Thompson Products Co., Cleveland, recently told Michigan automotive engineers to expect a future demand of only around 3,000,000 cars a year, after the immediate demand was satisfied. Mr. Colwell pointed out that new automobile prices are climbing rapidly beyond the reach of many who bought cars before the inflationary trend began. He declared the auto industry already has lost the "gradual step" effect of the prewar second-hand car market.

During recent weeks, leading automakers have cut back or deferred expansion plans and the auto industry has reduced its estimate of the postwar market for automobiles rather sharply.

Exporters are fearful that we may be pricing ourselves out of foreign markets. Some exporters report they are not now able to continue trade connections with old British and European customers because of the higher price levels here. Some of those who anticipated a large postwar market, especially after this country extended large credits to foreign buyers, are now veering to the opinion that the sharp rise in labor and materials costs here and the consequent higher prices they must ask for American goods will mean smaller foreign markets. The price advantage will be, they say, with British and continental countries where wages and materials have not advanced so sharply.

Price Level Generally Lower

Despite these threats, wholesale prices generally have not advanced to as high a level as in 1919 and 1920. According to the Department of Commerce index (see chart on page 79), wholesale prices in July had risen to 124.3, compared with an average of 138.6 in 1919 and 154.4 in 1920. Likewise the cost of living in July was 141, compared with a monthly average of 143.2 in 1920.

In contrast, factory payrolls have more than doubled at an index figure of 257.2 in June compared with 103.2 in 1919. Since 1941, industrial labor costs are estimated to have increased 60 per cent while industrial prices have advanced only 25 per cent. These figures admittedly are confusing to analysts as they appear to argue against buyers' strikes; it is apparent that factory wages today buy nearly twice as much as in the period following the first World War.

Complaints of lowered worker productivity or efficiency were heard in 1919 and 1920 as now. Although worker efficiency is difficult to measure and report in statistical terms, many employers now estimate productivity is at least 20 per cent under prewar levels. The problem is being recognized by the government which is sponsoring a "clinic" on the problem in Washington Oct. 28-29.

Encouraging in the present picture are the figures on overall industrial production which are being outstripped only by the payroll figures (see chart, page 79). Employment figures are running high, with 58 million employed and only 2 million jobless, including unemployables.

In fact, current employment is so high that, in the opinion of John D. Small, Civilian Production Administrator, the achievement of any substantial increase in overall production will depend on increased productivity of workers, lengthening the work-week or in increasing the total labor force.

Mr. Small believes that maintenance of the present rate of production until the end of the year would eliminate most of the problems of reconversion. CPA's report for August shows that production of basic materials was close to capacity and established a postwar peak.

Building materials made spectacular gains with increases of from 20 to 35 per cent over July in output of plumbing fixtures and other critical construction products. Production of nails, a bottleneck item, climbed 18 per cent.

Almost all kinds of consumer goods showed production advances over July.

Released at the same time as the August production figures were the Department of Commerce figures on manufacturers' inventories showing a further increase of $325 million during August, and bringing the total to $18.3 billion. The department, however, noted that the August increase was less than half that recorded in July.

The expansion of manufacturers' inventories is not viewed with any particular alarm as it is being accompanied by a substantial increase in shipments of finished goods and would be excessive only in event of a serious recession.

Consensus of manufacturers is that the pattern of the first world war aftermath, with its 1921 recession, need not recur. Through high production during the months ahead, the extremes of inflation and deflation can be avoided and a considerable period of prosperity enjoyed.

However, a new wave of wage demands, accompanied by work stoppages and loss of production, could create a greater inflation, destroy potential purchasing power and make another economic "bust" inevitable.

HISTORY OF AUTO PRICES

How automobile prices have fluctuated over the years is shown in the following figures on average wholesale value per unit produced. From a high of $2131 in 1907, the average wholesale price declined to $598 in 1917. During the first world war and the years immediately following, the higher prices of materials and labor were reflected in increases until 1920, after which the downward trend was resumed. No accurate estimate of the average wholesale price for 1946 can yet be made.

Year	Amount	Year	Amount
1904	$1055	1924	$624
1905	1905	1925	657
1906	1851	1926	695
1907	2131	1927	735
1908	2129	1928	674
1909	1288	1929	622
1910	1189	1930	591
1911	1128	1931	566
1912	941	1932	549
1913	867	1933	489
1914	762	1934	530
1915	644	1935	529
1916	604	1936	551
1917	598	1937	589
1918	850	1938	636
1919	882	1939	634
1920	949	1940	656
1921	719	1941	698
1922	659	1942	786
1923	606	1946	?

Power Strike Throttles Pittsburgh Activity

METALWORKING operations in the Pittsburgh district last week had receded to approximately 10 per cent of normal as result of the Duquesne Light Co. strike. Power output was reduced to one-third of normal and most of this was allocated to hospitals, water stations and similar users. Public transportation had broken down and an estimated 70,000 workers were idle.

The strike affected metalworking operations in other sections of the country as the flow of components from Pittsburgh plants, including electrical and railroad equipment, bolts and nuts, wire and castings, practically ceased. Open-hearth and steel finishing operations were well sustained as steel mills have their own power generating facilities. Electric furnace output, however, was curtailed sharply.

Despite the transportation breakdown, steel mills report enough men were able to get to their jobs to maintain a high rate of operations.

U. S. Steel, Union Reach Agreement On Elimination of Wage Inequities

Adjustments will amount to 3⅝ cents per employee hour. Project was started early in 1945. Wage adjustments will be retroactive to January, 1944, under directive of National War Labor Board. Incentive plans being reviewed

AGREEMENTS between five steel producing subsidiaries of the United States Steel Corp. and the United Steelworkers of America on principles and procedures to be followed in establishment of plant standard hourly wage scales and in the elimination of any intraplant inequities were reached last week.

These agreements, made with the union by Carnegie-Illinois Steel Corp., National Tube Co., American Steel & Wire Co., Tennessee Coal, Iron & Railroad Co. and Columbia Steel Co., provide the guideposts for eventual coverage of all corporation steel producing plant jobs under standard wage scales, which will include in each plant only one standard wage rate for each of approximately 30 job classes.

A large part of the project, begun early in 1945 by U. S. Steel management and union representatives, has already been accomplished. This involves a painstaking survey and thorough description of 25,000 different steel mill jobs, and their classification, with the co-operation of the union, into 30 general categories. This description and classification work, on a plant by plant basis, is continuing.

Under the plan formulated by the current agreements, it is understood that any wage rate adjustments eventually made (and retroactive to January, 1944, under the directive of the National War Labor Board) are to be solely for the purpose of eliminating intraplant wage rate inequities, and cannot be general across-the-board wage increases. The third quarter of 1943 or the 12-week period closest to that time will be used as the base payroll period from which to determine the plant standard hourly wage scales.

A representative cross-section of jobs in U. S. Steel plants discloses that equitable plant standard hourly wage scales will entail for the subsidiary companies, as compared to the base payroll period, a total expenditure equal to an average of 3⅝ cents per employee hour to provide any necessary upward adjustments.

Elimination of high out-of-line wage rates as the result of completion of the present management-union study will not apply to employees presently working at those rates until after Feb. 15, 1947. It is anticipated that normal turnover of employees and installation of new or revised incentive plans will be among the means utilized in the elimination of high out-of-line rates. All incentive plans will be reviewed and adjusted under principles of the agreement after the standard wage scales are established in the plants.

Canadian Steel Union Accepts Settlement Plan

TORONTO, ONT.

F. B. Kilbourn, government controller of Canada's basic steel industry, has announced the negotiating committee of the United Steelworkers of America-CIO has accepted a plan for settlement of the steel strike that has tied up Algoma Steel Corp., Sault Ste. Marie; the Steel Co. of Canada, Hamilton; and Dominion Steel & Coal Co., Sydney, since July 15. It is understood employees of the Steel Co. of Canada and Algoma Steel Corp. are offered an increase of 10 cents an hour retroactive to April 1 and a further 3 cents an hour when work is resumed, making a total of 13 cents against the union's original demand for 19½ cents an hour. Two weeks ago the union rejected the government's offer of wage increases of from 11 to 12½ cents an hour. At Dominion Steel & Coal, Sydney, N. S., the proposed increase is said to be 18 cents an hour, which provides for the 5 cents differential between steel wages in Nova Scotia and in Ontario. It is stated that the government subsidy would be boosted to meet the increase at the Nova Scotia plant. The original demand by the union was 24½ cents.

As a result of the strike, Canada's iron and steel production for July showed a loss of almost 50 per cent from June.

Comparative production figures, in net tons, follow:

	Steel Ingots, Castings	Pig Iron	Ferro-alloys
July, 1946	135,914	64,472	6,191
June, 1946	214,861	129,890	11,624
July, 1945	229,161	150,387	15,750
7 mos. 1946	1,585,553	940,495	75,057
7 mos. 1945	1,824,779	1,092,350	114,422
7 mos. 1944	1,747,001	1,115,527	105,750

Present, Past and Pending

■ APOLLO STEEL SALE REPORTED RECOMMENDED

PITTSBURGH—Sale of plant and inventories of Apollo Steel Co., Apollo, Pa., to Irving Grayson for a sum in excess of $2,500,000, is reported to have been approved by the board of directors. Special meeting of stockholders, it is understood, has been called for late October to approve the sale. Company's name will be changed to Apollo-Pittsburgh Co. and it will be liquidated over a period of time. The plant will be operated by the purchaser under a new name. It is understood Mr. Grayson represents a group of fabricators.

■ AUGUST VACUUM CLEANER OUTPUT AT ALLTIME PEAK

CLEVELAND—Factory sales of household vacuum cleaners in August were at an alltime high of 234,148 units, compared with 199,722 in July, and 170,272 in August, 1941. August sales broke the previous record of 217,906 established in March, 1941.

■ METALS RESERVE CONTRACTS FOR CHILEAN COPPER

WASHINGTON—Metals Reserve Co. has contracted for purchase of 40,000 tons of Chilean copper for fourth quarter delivery. Negotiations for other foreign copper purchases are underway.

■ SCRAP ADVISORY COMMITTEE APPROVES CPA CONTROLS

WASHINGTON—Iron & Steel Scrap Industry Advisory Committee has approved proposals of the Civilian Production Administration for controlling scrap inventories of both consumers and dealers. CPA is reported to favor limits of 45 days' supplies for steel mills and 30 days' for foundries.

■ STEELMAN SAYS CPA TO BE CONTINUED AFTER DEC. 31

WASHINGTON—Civilian Production Administration will be continued after Dec. 31 and none of its functions will be transferred to other agencies, according to Reconversion Director John Steelman.

■ AUGUST STRUCTURAL SHIPMENTS AT YEAR'S PEAK

NEW YORK—Shipments of 145,137 tons of fabricated structural steel in August were the largest for any month in 1946 and represented an increase of 13,186 tons over July.

Steel Leaders See Prosperous Future

Optimism qualified by possibility of further labor disturbances. Ten thousand attend convention and exposition of Association of Iron & Steel Engineers at Cleveland. Wide variety of technical subjects explored. New ore mining practice forecast

BARRING unnecessary disturbances, the steel industry faces a prosperous future, T. M. Girdler, chairman, Republic Steel Corp., Cleveland, declared at the opening of the 1946 convention and exposition of the Association of Iron & Steel Engineers in Cleveland Oct. 1-4.

Mr. Girdler's qualified optimism was shared by other industry leaders attending the meeting and show which attracted an attendance estimated at 10,000. The exposition was the first to be held since 1941.

Twelve technical sessions were held throughout the 4-day meetings, covering electrical, combustion, safety, lubrication, rolling mill and operating practice. A total of 39 papers was presented.

L. R. Milburn, electrical engineer, Great Lakes Steel Corp., Ecorse, Detroit, Mich., was elected president of the association for 1947.

R. W. McCann and H. F. Lesso, Great Lakes Steel Corp., were awarded first place in the 1945 Kelly Award for their paper on "Influence of the Charge Upon Open-Hearth Furnaces" by the board of directors of the association. Their paper gives extensive data on the character of the charge materials entering the furnace charge and evaluates the effects of variations in the charge upon the performance of the open hearth. Specific data are given in an extensive series of curves.

Ross E. Beynon, superintendent, Roll Shop Division, Carnegie-Illinois Steel Corp., Chicago, was awarded second place in the contest for his paper "Structural Mill and Structural Mill Roll Design". Mr. Beynon on two other occasions was cited for his contributions on bar and rail mill and roll design.

B. M. Larson and C. Siddall, research laboratory, United States Steel Corp., Kearny, N. J., were awarded third prize for their paper on "Theoretical Limiting Efficiency of Various Fuels in the Open Hearth". Their paper brings out factors which should be kept in mind in long range consideration of fuel selection and furnace design.

The 1947 convention will be held at the William Penn hotel in Pittsburgh Sept. 22-25.

"The sharp fluctuations in its operating rate have caused steel to be called the 'prince and pauper' industry," Mr. Girdler declared. "When demand for steel on the part of the heavy and consumer industries is high, steel is prosperous. When the demand decreases, steel production decreases in proportion.

"This fact is both an advantage and a disadvantage to the industry and because of it, it is only logical to assume that the next few years should see the steel industry at a close-to-capacity peak.

"Almost no steel has been used for other than war purposes for nearly five years. This has resulted in an accumulation of demand greater than we have ever seen in this country.

"Linked with that is the necessity for world reconstruction and the fact that steel industry outside of the United States has suffered serious war damages.

"Steel today is needed for housing, transportation, automobiles, pipe lines, electric power lines, vessels, commercial and industrial buildings, on the farm, and in a score of other industries. To satisfy these needs is a task which challenges an industry even as big as steel.

"However, the future is not entirely without serious questions.

"Strikes and industrial unrest have undoubtedly decreased the nation's potential purchasing power. How much this will affect the overall total demand cannot be estimated. We do know, however, that a continuation of this unrest, added to the necessity for increasing wages, may have an unhappy effect upon an otherwise bright picture.

"Secondly, I feel that our long-range stability and promise of prosperity may be clouded if industry expands too rapidly in an effort to meet an abnormal, accumulated demand for goods.

"There is always, of course, a need for industrial expansion and improvement. If that need is not met, industry stagnates.

"However, this normal expansion is

based on a sound, healthy 'look ahead' and not on a desire to 'capture and exhaust' markets as rapidly as possible.

E. G. Grace, chairman, Bethlehem Steel Co., Bethlehem, Pa., in commenting on the future of the industry, pointed out that anything that would hamstring the industry or impair its efficiency constituted in effect an attack on our national economy.

Mr. Grace called attention to the remarkable stability with which the industry converted from a war to a peacetime basis and gave credit to the high quality of management and technical talents of the industry.

Critical survey of government regulations was urged in a statement at the convention issued by Wilfred Sykes, president, Inland Steel Co., Chicago. Pointing out that the incentives and competition of the free enterprise system have given the nation the highest standard of living and the greatest productivity per man hour of labor of any nation, he said that in our complex civilization certain controls become necessary but that it is important we recognize essential restrictions and differentiate between them and such restrictions as have developed counter to the fundamentals of free enterprise.

Elected president of the Association of Iron & Steel Engineers for 1947 was L. R. Milburn, electrical engineer, Great Lakes Steel Corp., Ecorse, Mich.

E. M. Richards, operating vice president, Republic Steel Corp., addressed the convention banquet Oct. 3 on "Where Are Union Policies Leading?" He pointed out that unless local officers of unions and their followers change their attitude and treat a contract as a legal and binding instrument, the union cause in the long run will suffer. Union leaders should recognize, he said, that in the final analysis the success of business is just as important to them and their followers as to management. If business cannot prosper, the worker cannot prosper.

This nation can continue to draw the major portion of its iron ore requirements from the Mesabi range in Minnesota for another century or two, but to accomplish this, great changes must take place in the present mining industry, E. W. Davis, University of Minnesota, Minneapolis, warned.

Mr. Davis stated that the geological formations making up the Mesabi range are composed of a type of rock called taconite, containing about 30 per cent iron and 50 per cent silica, and stretching across northern Minnesota in a continuous sheet 100 miles long and several hundred feet thick. If this rock is ground fine enough, the grains of iron oxide can be removed in a fairly pure state, he stated.

From leached areas found here and there along the range, over one billion tons of iron ore have been taken out in the last 50 years. The average analysis of this ore has been 51.8 per cent iron, 7.61 silica and 0.062 phosphorus. Open pit direct shipping has accounted for 963,556,000 tons; underground direct shipping, 265,783,000 tons; and concentrates, 207,147,000 tons.

No Great Discoveries Expected

In view of the simple geological nature of the Mesabi range and the extensive exploration that has been done, the discovery of any new large bodies of high grade ore is improbable. Most of the mining companies reluctantly gave up this hope many years ago. Mr. Davis pointed out that some new ore undoubtedly will be discovered since the tonnage estimates computed by the tax commission are conservative, but no great discoveries of new ore should be expected in this district, he warned.

There are about a billion tons of iron ore remaining on the Mesabi of the types now being shipped, and if this tonnage is divided by an estimated production, say 35 million tons a year, the life of the Mesabi range becomes about 30 years. However, if the production rate is 70 million tons annually as in 1942, the ore will last only 15 years.

The speaker mentioned that such a simple method of calculation leaves entirely the wrong impression. Nearly all of the ore on the Mesabi range is owned by various consuming interests and even these do not all own ore reserves that are proportional to their annual requirements. While some of the steel companies have reserves for perhaps 30 years, others will exhaust their reserve in 5 years or less, Mr. Davis contended. He explained that there is no real shortage of iron in this part of the world. The only question, he stated, is from which of several sources can ore be secured at the lowest delivered cost. He directed attention to the fact that nearly all the steel companies have engineers engaged in a search for a new supply of ore. Some are in South America, Cuba, Labrador, New York and some working on taconites of the Mesabi. In the speaker's opinion, work in this direction would not be so active if steelmakers had a 20-year ore supply on the Mesabi as casual statistics might seem to indicate.

Use of Taconite Emphasized

If the Mesabi is to continue for long to supply the major portion of the iron ore smelted in this country, Mr. Davis emphasized that this ore must come from the large supply of taconite that exists in this district. Several companies have acquired great areas of taconite on the range, he said, and are actively engaged in developing these properties and studying their concentrating characteristics.

Since taconite is low in iron, it will be necessary to mine 3 tons of the rock and reject 2 tons as tailing in order to produce 1 ton of shipping product. To make such an operation economical, Mr. Davis explained, it must be accomplished in large plants in which every advantage is taken of the possibility of cost reduction.

Figures obtained from many sources show that the cost of a taconite plant to produce a million tons of agglomerated ore per year will be about $10 million. Moreover, he stated, this agglomerated taconite can be produced at a cost only slightly above normal Lake Erie prices. Large scale blast furnace smelting tests, using high-grade magnetite sinter, indicate a considerable saving in smelting cost over the cost of smelting normal lake ore. Therefore, while the cost of producing taconite concentrate may be higher than the present cost of lake ore, smelting costs will be lower and, the

(*Please turn to Page* 196)

Committees To Be Set Up To Plan Industry Mobilization for War

Some 75 or more groups to be created to work with Army & Navy Munitions Board. Plan envisions fullest utilization of industry for war production and maintaining of civilian economy in event of future hostilities

WASHINGTON

IN THE course of the next month or two many manufacturers will be invited to help prepare plans for the mobilization of industry in event of another war. They will be asked to serve as members of 75 or more committees to work with the Army and Navy Munitions Board, or as members of one or more of several hundred subcommittees that will have special detail and technical assignments.

This network of industry committees, on the basis of present plans, will be formed largely with the assistance of the three organizations that make a business of co-operating with the armed forces.

These are the Navy Industrial Association, the Army Ordnance Association and the Aircraft Industries Association of America. The first-named body already has played its part in the program under the direction of a special 17-man Industrial Mobilization Committee. The other two will take similar action.

The general objective is to enroll representatives of every sector of American industry — representing companies large and small—to set up plans for the effective use of industry should another war break out and, after the plans have been formulated, to keep them continually revised to keep abreast of changing conditions.

The first task for this committee system is to determine, "from industry itself, what raw materials, basic materials, component parts and end items were bottlenecks during World War II so that these difficulties can be eliminated or minimized in our next emergency." After this information has been obtained, the board will proceed with the formulation of a "written, explicit industrial mobilization plan."

The speed with which the program is to be tackled is indicated by a statement by Richard R. Deupree, the board's executive chairman. "My guess," says Mr. Deupree, "is that the board will come up with good practical and factual presentation, ready for continuous revisions and review, sometime during 1947."

The board, as indicated by Mr. Deupree, already has accomplished a large amount of preliminary work:

1—It has completed the skeleton outline of the complete industrial mobilization plan for later development.

2—In the belief that the War Production Board, properly constituted, will inevitably be the cornerstone of an effective industrial harness in any forthcoming emergency, the board "has authorized the creation of a group of distinguished civilians who will be selected from those who had experience with WPB in the last war, and who will develop a manual which will embody the organizational changes in the WPB structure consid-

GE, Army Co-operate in Guided Missile Research

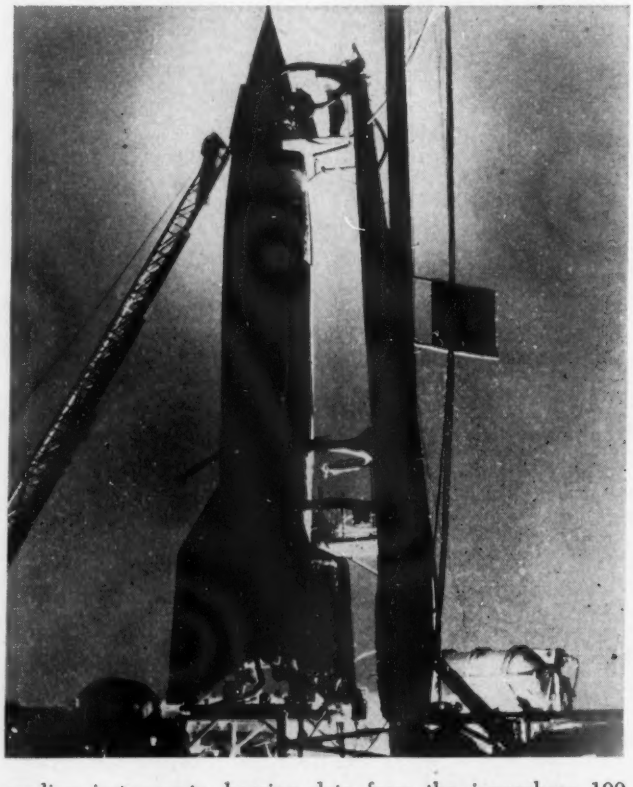
ROCKETS that will surpass the German V-2 in speed, distance, accuracy and effectiveness are the objects of a program of guided missile research being conducted jointly by General Electric Co. and the Army Ordnance Department.

The joint program really started during the war when GE scientists were sent to Europe in November, 1944, to study captured V-2 rockets. Later special facilities were provided by the Army at the GE Schenectady works for testing new types of missiles and motors, and company scientists have been assisting the Army in test firings at the proving grounds at White Sands, N. Mex.

R. S. Neblett, manager of GE's Federal & Marine Divisions, disclosed that power propulsion research is being made on rocket engines, ram-jets and a combination of both. The ram-jet is simply a cylinder which compresses air through speed in flight, adds and ignites fuel in the combustion chamber, and derives forward motion from the thrust produced by expanding gases which blast through the nozzle. Dependent on oxygen from air, ram-jets are subject to range-altitude limitation; their ceiling cannot much exceed the maximum altitude for aircraft.

Development and use of new and more powerful fuels create metallurgical problems. Materials must have greater strength, more corrosion resistance and higher melting points. Rocket fuel, as used by the Germans, was liquid oxygen and alcohol, mixed in the combustion chamber.

In test flights to determine the nature of the upper air, special instruments replace the war head of the rockets. Weighing as much as 1800 pounds, these instruments, through radio impulses, relay to the ground temperatures, pressures, cosmic ray, spectograph studies and other information. By forcible ejection from the body of the missile, delicate recording instruments, bearing data from the ionosphere 100 miles above the earth, can be parachuted to the ground undamaged. Accompanying photo shows a test rocket being made ready by the light of moon and floodlights.



ered necessary as the result of actual experience with the one which was developed in the midst of the war."

3—The board has "reconciled and formalized" Army and Navy action on about 3000 war plants in which the two services are interested, and of these over 2000 have been cleared to the War Assets Administration for disposal action. The board also has about completed clarification of the retention or disposal status of the remaining plants—the socalled "twilight zone" establishments. "The whole pattern thus established is now under study by Mr. Donald Nelson."

4—The board has set up stockpiling objectives over a period of years to come, and already has determined on the purchase program during the first year under the new stockpiling act.

5—The board has undertaken a study to promote co-ordinated buying on the part of the Army and Navy but it probably will take several years to complete this task in view of the difficulties involved. "If the program does not accomplish effective and economical purchase it will be of no value." Standardization must receive careful attention. "For example, in a radar set of similar operating characteristics, the Army must have dust protection while the Navy must have comparatively small size and resistance to gunfire shock."

6—The board, by joint action by the secretaries of war and navy, recently was given responsibility in determining the military interest in United States import and export policies. As a result it holds membership on inter-agency State Department committees concerned with different phases of economic foreign policy.

7—The board has made progress in locating, surveying and cataloging all underground plant sites, including caves and abandoned mines.

8—The board is working on one subject of specific individual importance to large numbers of contractors. That is coordination of the packaging and packing specifications of the Army and Navy.

One of the matters that will be taken up in detail with the 75 industry committees and various subcommittees is that having to do with plant locations.

In addition to Mr. Deupree, the members of the board are Kenneth C. Royall, undersecretary of war, and W. John Kenney, assistant secretary of the navy. The board has two deputy executive chairmen, Brig. Gen. Sidney P. Spalding for the War Department and Rear Admiral Roger W. Paint for the Navy. It has a staff of some 50 Army and Navy officers and civil service employees drawn from the two services. In policy matters it is advised by a committee of top staff officers of the Army and Navy.

OPA Reported Discussing Steel Price Decontrol with Industry

DECONTROL of prices on iron and steel products is reported under consideration by the Office of Price Administration. It is understood in informed quarters that members of the Steel Industry Advisory Committee already have held initial conversations with the OPA on the subject, the conversations encompassing the entire range of products produced in the industry.

It is not clear whether this action means that the advisory committee's application for upward revision in price ceilings has been indefinitely deferred. However, up to late last week no such application had been filed with OPA.

As a general thing it is thought early decontrol of prices on the entire range of steel products is unlikely. Removal of price ceilings on such scarce products as sheets and strip, it is said, is not likely so long as demand is far in excess of production as at present, and especially since there is little promise of any material easing in the supply of these products before mid-1947.

An important development of the past week was the action of OPA permitting delivered prices on iron and steel products at Toledo, O., Detroit, eastern Michigan, Mahoning Valley, and the Gulf and Pacific Coast points to be increased, effective Oct. 9, to permit sellers to pass on to consumers the increase in freight rates which became effective July 1. The increases amount to 50 cents per gross ton for ingots, blooms, billets, slabs and sheet bars and 3½ cents per 100 pounds for all other iron and steel products. This is provided in amendment 43 to price schedule 49.

The practice in the industry has been to quote flat delivered prices for shipment into these areas which were less than the aggregate of the price at the nearest governing basing point plus applicable transportation charges from such point. Under terms of price schedule No. 6, the increase in freight rates which became effective July 1 could not be passed on to the consumers in these territories.

The amounts of the adjustment were computed by the Office of Price Administration as closely as possible to permit mills to charge the same proportion of the freight increase to the consumer at the named points as they are already permitted to charge under the basing point system where the consumer bears all freight increases from the basing point to delivery points.

Amendment 43 to price schedule 49 provides for a passthrough at the warehouse level of increases in the mill arbitrary basing point prices.

Federal Trade Commission Expected To Ask Supreme Court Review Basing Point Ruling

IF THE reasoning of the Seventh Circuit Court of Appeals in the cement basing point case is upheld by the Supreme Court, the United States Steel Corp. apparently has little reason to worry about the final action on its recent request for permission to meet competitors' delivered prices on steel products at consuming points.

That is the opinion of antitrust law specialists after careful study of the decision (see STEEL, Sept. 30, p. 33). The Circuit Court flatly denied the Federal Trade Commission's contention that absorption of freight to meet competitors' delivered prices is illegal. That right, the court held, definitely is given under Section 2 (b) of the Robinson-Patman Act. The Circuit Court decision is regarded as a major defeat for the Federal Trade Commission.

The court regarded as radical the commission's contention that cement should be sold strictly on the basis of fob mill, and that the delivered price in each instance should be the fob mill price plus the actual freight from the mill to the consuming point.

The Circuit Court in the cement decision reaffirmed the illegality of charging phantom freight rates.

The Federal Trade Commission now has no alternative but to petition the Supreme Court for a review.

It is recalled that the Supreme Court in 1925 gave the cement basing point system a clean bill of health in the Department of Justice suit under the Sherman Antitrust Act. Since then there has been a substantial change in the Supreme Court's philosophy, so that its previous cement decision probably is no reliable guide as to what it may decide in reviewing the cement case.

Export Tool Trade Less Active Now

Failure of government to approve loans to several foreign nations reflected. Competition increasing in world market

FAILURE of the government to approve loans to several foreign countries has cut sharply into the export business of leading machine tool builders. Prior to V-J Day pent-up demand for American tools rose to record proportions in China as extensive plans were laid for industrialization of many sections of that country. Actual sales to that country, however, have been negligible due chiefly to lack of exchange, although unsettled political conditions have also hampered fulfillment of postwar plans.

Some foreign buyers have obtained required machinery elsewhere with which to retool their plants, either by rebuilding and reconditioning old ones or by placing orders with British, Swiss, Swedish or Czechoslovakian producers.

While competition from these latter interests is increasing in the export market, American producers generally still have an advantage from a delivery standpoint. British producers, for instance, are now promising deliveries in a year on new business whereas the American industry can promise shipments in three to six months on most types.

On the other hand, foreign producers have a price advantage on most machine tools. Czechoslovakian prices are about 40 per cent lower than American quotations while British prices are about 26 per cent lower. However, this applies chiefly to the smaller types of machines, this country being on an equal or lower price basis on the larger and some special machines.

Production of machine tools is still hampered by serious shortages of materials, components and labor. Control panels, for instance, are delaying the completion of some equipment and the shortage of castings is equally critical. Availability of electric motors and bearings has improved markedly in recent weeks. Skilled workers, especially engineers and machinists, are very difficult to find.

Despite production difficulties, however, many companies are approaching a spot delivery situation and may attain it in most types of tools by the yearend.

SETTLE STRIKE: Officials of Allis-Chalmers Mfg. Co. and the CIO electrical, radio and machine workers union sign a contract ending a 28-week strike at the company's Norwood plant in Cincinnati. Left to right: Emerson Sonnycalb, union president; Arthur Fuhrman, union vice president; Arnold Thorsen, plant production manager; G. E. Hager, personnel superintendent; W. J. McGowan, company attorney. NEA photo

Otto Pfaff Heads Foundry Equipment Manufacturers

Otto A. Pfaff, president, American Foundry Equipment Co., Mishawaka, Ind., was elected president of the Foundry Equipment Manufacturers Association at the society's annual meeting at the Homestead, Hot Springs, Va., Sept. 24-26. He succeeds Thomas Kaveny Jr., president, Herman Pneumatic Machine Co., Pittsburgh.

William L. Dean, vice president and general manager, Mathews Conveyer Co., Ellwood City, Pa., was elected vice president of the association, and Arthur J. Tuscany, Cleveland, was re-elected executive secretary-treasurer.

New directors: P. F. Bauer, Allis-Chalmers Mfg. Co., Milwaukee; H. S. Hersey, C. O. Bartlett & Snow Co., Cleveland; and Otto A. Pfaff, American Foundry Equipment Co., Mishawaka, Ind.

At the first session, President Kaveny announced formation of a Foundry Equipment Committee of the Industrial College of the Armed Forces.

R. L. McIlvaine, National Engineering Co., Chicago, described the activities of the group's Public Relations Committee.

At the second session President Kaveny discussed the recent action of OPA on foundry equipment. P. F. Bauer reported war surplus sales of foundry equipment and stated a timetable had been developed looking toward the sale or scrapping of surplus equipment within a year. President Kaveny and Frank G. Steinebach, editor of *The Foundry*, discussed the proposed National Castings Council.

Earl L. Shaner, president, Penton Publishing Co., and editor-in-chief of STEEL, described his trip around the world as a member of the Pauley Reparations Mission. Mr. Shaner indicated the important contributions of American equipment, especially transportation equipment, in all of the countries he visited, and stressed the tremendous needs that now exist if these countries are to recover to any extent from the war.

Malleable Founders Told Pig Iron Supply Improves

At the recent meeting of the Malleable Founders' Society at Haddon Hall, Atlantic City, N. J., John A. Claussen, chief of the Pig Iron Section, CPA, discussing the problem of pig iron supply for malleable founders explained that some improvement is being made, since produc-

tion of foundry and malleable iron increased from approximately 350,000 tons in July to 386,000 tons in August. Not over 40,000 tons of foundry and malleable iron is on hand at the furnaces.

Plans are under way to bring in additional furnace capacity but critical shortages of coke, and in some districts shortages of iron ore, indicate the possibility that this program may not develop as much pig iron as previously had been estimated by Washington.

Francis J. Buckley, head of the Castings Section of CPA, stated that preliminary reports for August indicate malleable foundries used about 27,000 tons of pig iron to produce approximately 70,000 tons of malleable castings. This was the highest monthly production of malleable iron for the past 12 months. Mr. Buckley also indicated the CPA needs better statistics, and recommended foundrymen speed up the supply of necessary data.

Warren Hutf, head of the Metallics Division of OPA, discussed the new price regulations on scrap. He indicated there has been an improvement in the scrap supply since the recent OPA action.

Mechanical Engineers Hold Fall Meeting at Boston

Metal cutting and production engineering in the textile and wood industries as well as engineering and industrial education were emphasized in discussions at the fall convention in Boston last week of the American Society of Mechanical Engineers. More than 1000 attended the sessions.

Keynote address of the meeting was delivered by Frederick S. Blackall Jr., president, Taft Pierce Mfg. Co., Woonsocket, R. I., at a luncheon which was attended by Gov. Maurice Tobin of Massachusetts. Mr. Blackall urged technical societies to guard against "gate" crashing by self-styled engineers who cannot even read a slide rule. He said he believed five-year engineering courses soon will be necessary because of the tremendous technical advances, thus putting engineering on a parity with medicine and law as a profession.

Machine Tool Deliveries at St. Louis Picking up

St. Louis — Machine tool deliveries are picking up a bit. Standard lathes are reported available in 12 to 14 weeks, although sheet metal equipment still requires a year or more.

Surplus sales in this district are diminishing, which promises to raise local demand for new tools unless surpluses from other areas are sent in for disposal. New tool demand has been fairly active here for many weeks, even though used ones came in for first consideration by most buyers.

Some dealers express surprise that removal of price ceilings had so little effect. There were no price rises of consequence and prices now do not average more than 12½ per cent above 1941.

Republic Offers $30 Million for Chicago Plant

Four other bids received for surplus alloy steel facilities at second offering. Kaiser-Frazer Corp. proposes lease terms

REPUBLIC Steel Corp., Cleveland, was high bidder for the $92 million surplus South Chicago steel plant which Republic built for the government in 1943 and has since operated. Republic offered to purchase the plant for $30 million, which was the highest of the five bids received.

Second largest offer for purchase was $28,250,000 by Philip D. Fitzgerald, of Chester J. Clark & Associates, consulting engineers, Chicago, acting for an unidentified group. John W. Turkovich, a war veteran from Detroit, and representing no company, offered $20,233,894. C. A. Depue, president, Central Steel Tube Co., Clinton, Iowa, made a purchase bid of $19,230,000.

Kaiser-Frazer Corp., Detroit, made a proposal to lease the property.

Last spring, WAA rejected a bid for lease from Republic and a purchase bid from Mr. Depue as too low.

The new Republic proposal for purchase would be payable in annual installments of $1,500,000 over a 20-year period without interest. At the same time it resubmitted its once-rejected bid to lease the plant for five years at a minimum rental of $200,000 a year.

Mr. Fitzgerald offered to deliver $4 million within 10 days after consummation of purchase, the remainder to be paid as follows: Two years after acquisition, $6,087,000; and on each of the following three years a similar payment.

Mr. Depue's offer of $19,230,000 compared with his previous offer of $17,500,000.

The Kaiser-Frazer offer of lease proposed a minimum rental of $875,000 for the first year, $1 million minimum for the second year, and $1,100,000 for the third and each succeeding year. Rentals would be based on tonnage output. Operation of the plant would be to supply semi-finished steel to other steelmakers.

Several bidders pointed out that the plant was built for production of electric alloy steel and is not readily adapted to production of peacetime products without considerable alterations which they proposed to make. Republic estimated improvements would cost $20 million.

GOVERNMENT CONTROL DIGEST

OFFICE OF PRICE ADMINISTRATION

Cast Iron and Enamelware: Manufacturers of household cast iron and enamelware no longer are required to pre-ticket their product with the retail price. Several clarifying changes also were made in the order. (MPR-188; OPA-T-5032)

Hand Tools: Sellers of certain hand tools and related hardware items may use, effective Oct. 2, either of the following two methods of allocating transportation charges to articles to determine their net cost: Method provided in the regulation or the established method of allocation that they used immediately preceding Aug. 2, 1946. (MPR-614; OPA-T-5032)

Woodworking Machinery: Producers of woodworking and timber working machinery and equipment granted an interim increase of 16 per cent, effective Sept. 27, replacing the former increase of 10 per cent over base date maximum sales prices. (MPR-136; OPA-T-5042)

Price Control Exemption: Aluminum furniture, wrought iron furniture and specified accessories for hospital beds have been removed from price control, effective Sept. 30. (SO-126)

Price Control Suspension: Imported industrial machinery, automobiles, furniture, motorcycles, cameras and photographic equipment, chinaware, glassware, and household utensils and appliances have been suspended from price control. In addition, 42 specific items, including sponge iron and metallic cloths, were suspended from price control, effective Sept. 25. (SO-184; OPA-6825)

Pig Iron: Effective as of Sept. 1, a producer of foundry or malleable grades of pig iron, who also has been supplying customers with steel grade pig iron, is permitted to pass on to another producer both the supplying of steel grade pig iron and a part of the premium payment he receives. This will free the original producer to concentrate on making foundry and malleable grades, the only grades for which incentive payments will be made by the government. Present level of ceilings for all grades of merchant pig iron remains unchanged, since the bonus payments will be made before final sale to the consumer, which will take place at ceiling price. (MPR-10; OPA-T-5025)

CIVILIAN PRODUCTION ADMINISTRATION

Cast Iron Soil Pipe: To facilitate producers' conversion to a greater output of housing-size cast iron soil pipe and fittings without loss of total tonnage, CPA has provided for conditional temporary deferment, in certain cases, of the requirement for reducing production of large sizes. (VHP-4; CPA-LD-291)

Bale Tie Wire: Period during which the War Assets Administration is required to channel government surplus of bale tie wire to producers of bale ties has been extended for 60 days to Nov. 30. WAA was required to set aside, out of government surplus, 7500 tons of carbon steel black annealed or galvanized wire suitable for use in making wire bale ties. The extension was ordered because this amount was not reached by Sept. 30. (PR-13; CPA-LD-286)

Windows of Washington

By E. C. KREUTZBERG *Washington Editor, STEEL*

German manufactured goods, largely toys, Christmas tree ornaments, china, optical goods, etc., to begin moving to the United States soon. Resumption of trading aimed at helping defeated Germany get on self-supporting basis

IT IS a historical axiom that the enemy nation of today becomes the friend of tomorrow. Despite our attitude before, during and immediately after World War II, our relations with Germany are trending in that direction. For reasons that are well understood by the American public, our policy now calls for restoration of a unified Germany, to be governed by the Germans themselves in the democratic tradition. And now, a little more than a year since American and German soldiers ceased shooting each other, we have taken a step that shows clearly which way the wind is blowing. We have begun to trade with the Germans.

As agent for the Office of Military Government, United States Zone, the U. S. Commercial Co. already has begun shipping German manufactured products which will start to arrive in the United States within one or two weeks. Included is a large consignment of toys and Christmas tree ornaments, and smaller lots of china, porcelain and earthenware, cameras, wine and optical goods.

Two Objectives

The purpose is twofold. Unless we help the Germans to get on a self-supporting basis, there will be no basis for organizing the Germans along democratic lines—and when using that term our people are thinking in terms of United States as opposed to Russian democratic concepts. The other objective is to take from the shoulders of American taxpayers at least a part of the burden of feeding the Germans. Our people want to get some dollars into Germany so as to exchange food for value received.

The U. S. Commercial Co. now is discussing the most effective manner of marketing these commodities in the United States. The toys and Christmas tree ornaments probably will be put on display in New York, with resulting sales either on an auction or negotiated basis, depending on the amount of interest shown. Probably the same general method will be employed in marketing the other types of goods. Later on, leather goods and wood products will be brought in, also silverware and costume jewelry.

The Office of International Trade, Commerce Department, which several weeks ago invited prospective American importers to signify whether they want to journey to Germany to inspect samples of available goods, reports that favorable responses have been received from about 100 firms. These names have been submitted to OMGUS (Office of Military Government United States Zone) and the latter now is trying to arrange effective visits for these American business men.

It may be some time before some of these visits can materialize. This is because of certain obstacles. For instance, although the Radio Corp. of America and Philco recently indicated a desire to buy up to 50,000 German-made radio cabinets, it will take some time before the German manufacturers will be in a position to make any promises. A chief drawback has been finding sources of hinges and other fittings for the cabinets; also there has been some difficulty about arranging for supplies of suitable wood.

OMGUS now is studying the possibilities of permitting American and German business men to communicate with each other. At present personal mail is permitted. This is to be expanded shortly to include so-called "non-transactional" mail. American importers and German exporters would be able by correspondence to exchange information about types, sizes, quantities, details of design, etc. Then the actual deals could be closed quickly either by OMGUS direct or by the U. S. Commercial Co

The U. S. Commercial Co. and OMGUS are endeavoring to set up a policy of marketing German goods that will be fair to everybody concerned. They do not propose to "dump" German goods at the expense of American industry. And they are prepared to respect prewar patent and contract rights of American concerns. For instance, where an American importer had the exclusive representation for a certain make of German camera, he will receive preferred treatment.

An administration man who has an active part in carrying out this program points out that no huge importation program is necessary to enable the Germans in the United States occupied zone to balance their dollar obligations. Recent estimates, as used by Secretary Byrnes in his remarks at Paris, are that occupation of our zone in Germany is now costing us at the rate of about $200 million per year.

LT. GEN. R. M. LITTLEJOHN

The War Assets Administrator told a special House committee investigating surplus property disposal that he had recently ordered wholesale "firings" in the WAA as result of irregularities in the electronics division

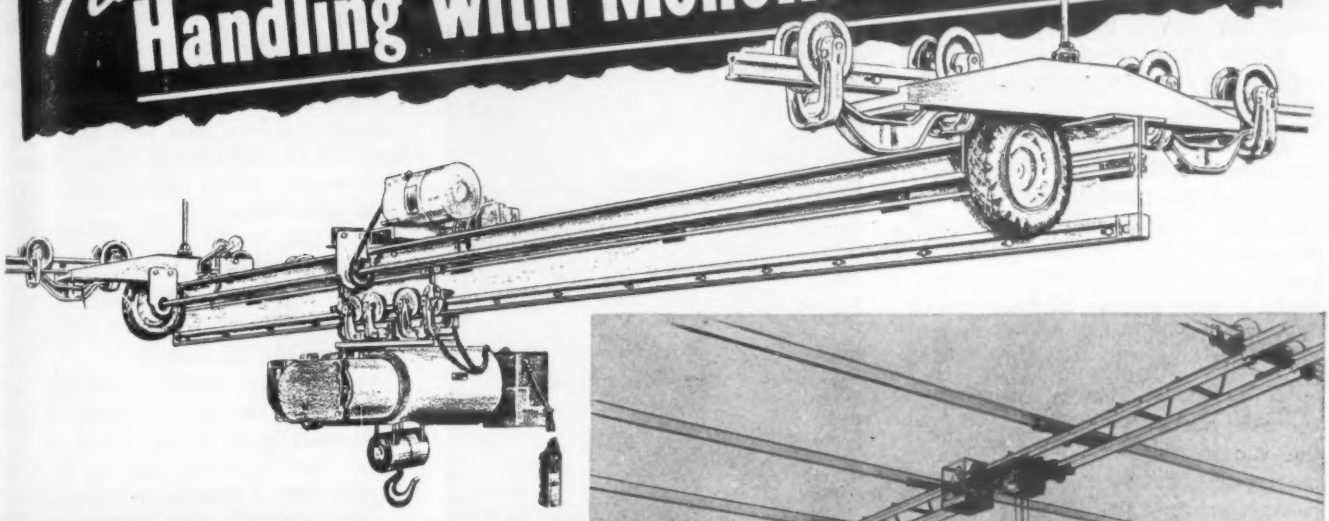
Venture Capital Comes Out

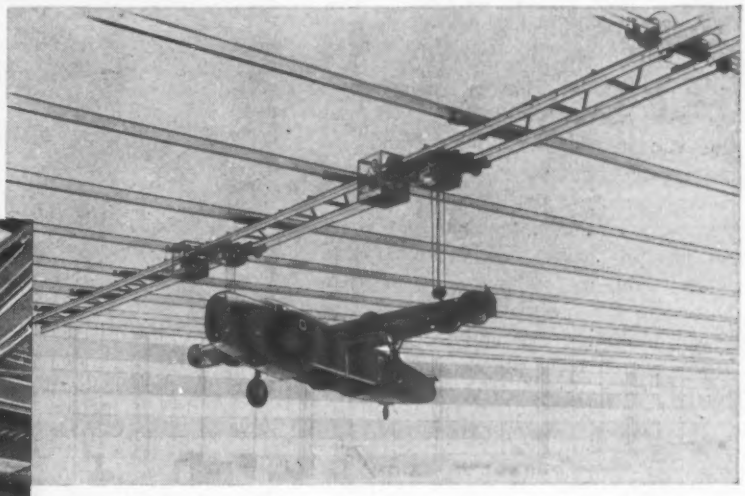
If the recent expansion in the security market proves to be more than a flash in the pan, proponents of enlarged government participation in activities formerly reserved to private business will have lost one of their prime arguments. That is that private investment no longer is sufficient to expand industry.

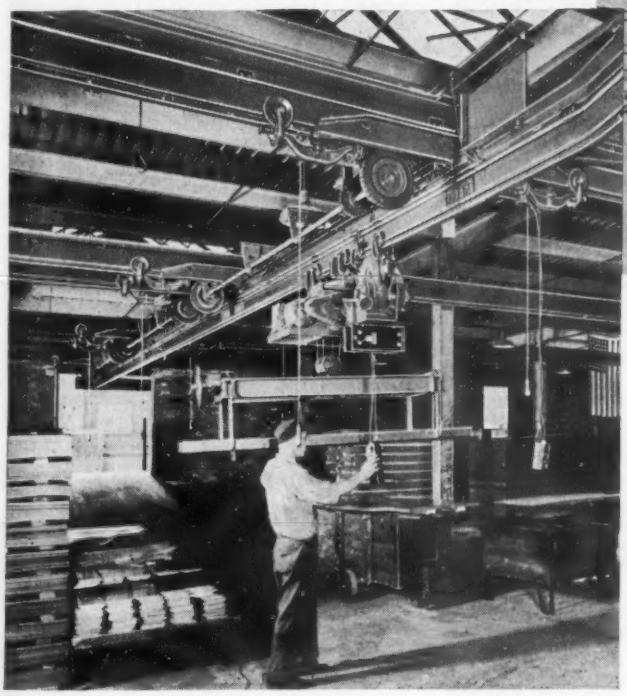
A year ago Preston Delano, comptroller of the currency, continued to express the fear that future business expansion might be held up because of insufficiency of investment capital. He pointed out that investment of individual savings in industrial securities had been inadequate for more than a decade previous.

His report for the fiscal year ended June 30, 1946, is much more optimistic. "It is gratifying to note," he writes "that during 1946 the public began once more to furnish venture capital in substantial amounts. During the year new

Flexible Handling with MonoRail Cranes







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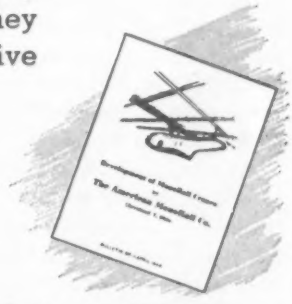


THE AMERICAN MONORAIL COMPANY

13102 ATHENS AVENUE CLEVELAND 7, OHIO

corporate stock issues exceeded $1,300,000,000, an amount greatly in excess of any year since 1930. Half this amount was issued for the purpose of providing new capital. During the first months of 1946 equity securities to provide new corporate capital have been purchased by the public at a rate over twice that of the preceding year.

"It is encouraging to observe this resurgence of confidence among investors in the expansion possibilities of our country, and that new enterprises can still gain support from the savings of the public rather than from government funds or from commercial banks which might otherwise feel obligated to step into the breach."

Mr. Delano also writes optimistically about the banks; they have emerged from the war in sound condition "and are participating vigorously in the domestic reconversion program." At the same time they are encouraging stability by seeking to restrain loans "within reasonable limits" and by seeking to discourage borrowing for speculative purposes.

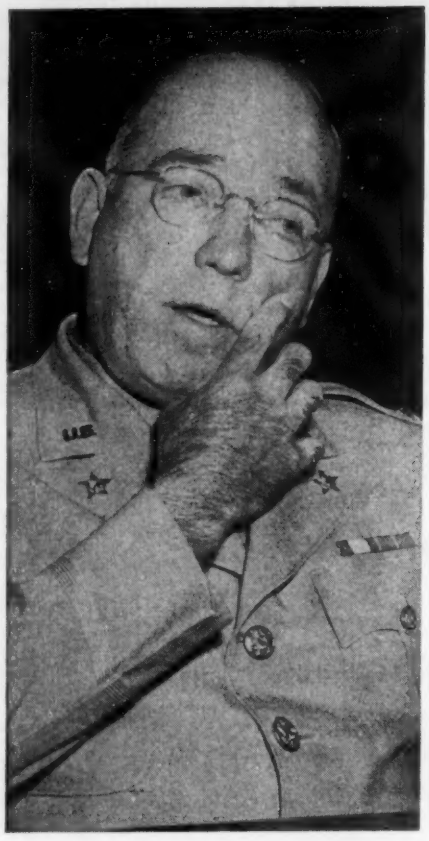
Net profits of the national banks in 1945 equaled 10.97 per cent on average capital accounts.

Home, Sweet Home

Temple Trailer Village, on Telegraph Road, Alexandria, Va., is gaining rapidly as a Mecca not only for trailer manufacturers but for makers of many household and other items in the consumer goods category. Of the many trailer camps scattered about the outskirts of metropolitan Washington, Temple is the most attractive and is regarded as a place where sound ideas about future housing needs may be developed.

Temple has 195 trailer families which shortly will be expanded to 545. Each trailer is on a 30 x 40-foot lot. Each lot has sewer and water connections and with it goes a private bath house. The trailer occupants take pride in their homes and have decorated their lots with fine lawns and shrubs. Some of them have added cozy porches. A monthly rental of $15 to $25 covers all charges at Temple outside of the cost of the trailer and its furniture.

While no accurate census has been taken of the trailer population of Washington it certainly is more than 50,000—including men, women and children—and probably is closer to 75,000. Mature opinion of trailer salesmen who contact the people in these camps is that the trailer trend is not just a fad but is here to stay. For there is no other arrangement, they claim, whereby snug housing facilities may be had at anywhere near the investment represented by a trailer, plus rent and cost of upkeep. Trailer occupants, says a salesman, find their income goes farther when living in trailers, and many of them would resist a reduction in their purchasing power that would result from occupancy of a conventional home.



COL. A. J. McFARLAND

Secretary to the Joint Chiefs of Staff, Colonel McFarland was called before the Senate War Investigating Committee recently to explain why files on the Canol project are still labeled "secret"

On More Prosaic Job

Under a $181,080 contract from the Bureau of Reclamation the General Electric Co., Schenectady, N. Y., will install two 75,000-kilowatt main generators at Shasta Dam, Calif. Originally ordered for Shasta Dam, the generators now are historically significant because of their temporary use at Grand Coulee dam, in Washington, where they furnished power consumed at the Hanford, Wash., atom bomb plant. In their new location they will be used for pumping Sacramento River water up into the Delta-Mendota canal whence it will flow into the San Joaquin River to irrigate farm lands.

Patent Agreement Expected

After conferences for many months past with each other and with representatives of industry, Army and Navy authorities are reported as close to agreement on patent clauses to be incorporated in future contracts covering scientific research and development work. The program is in the hands of the War Department's Offices of Procurement and Judge Advocate and the Navy's Office of Naval Research. It is expected that the principal change, already approved by the Navy, will recognize contractor ownership of inventions used in doing work for the government, but for which patent applications have been filed prior to the performance of the contract. The proposal also entails giving subcontractors the same protection.

Top Level Navy Changes

Navy top command changes include the following which are of interest to many readers of STEEL:

Vice Admiral Louis E. Denfield will become Commander in Chief, Pacific Fleet and Pacific Ocean Areas, in January, 1947, replacing Admiral John H. Towers who will retire in February.

Vice Admiral Edward L. Cochrane, present chief of the Bureau of Ships, will become Chief of the Material Division, Office of the Assistant Secretary of the Navy, in November, 1946, replacing Admiral Ben Moreell, who is leaving the Navy to take a position in private industry.

Vice Admiral Earl W. Mills, now Deputy Chief of the Bureau of Ships, will become chief of that bureau in November.

Commodore Paul F. Lee, will become Chief of Naval Research, Navy Department, in November succeeding Vice Admiral Harold G. Bowen who will retire.

Gas Preferred for Heating

Gas is the favored heating fuel in new homes now being built, according to the National Housing Agency. A survey shows that builders are installing gas heaters in 52 per cent of the new homes, coal heaters in 27 per cent and oil heaters in 21 per cent. The analysis was reached by classifying priority applications for 629,000 dwelling units received between Jan. 15 and July 26.

Navy Helps Contractors

To expedite production under its contracts, the Navy during the war extended the following financial assistance to contractors who were unable to obtain private financing: $2,021,814,002 in the form of advance payments, and $2,215,000,000 in guaranteed loans.

Losses sustained in this program came to $845,256 on advance payments and $975,732 on guaranteed loans—an overall loss ratio of only 0.00043. This was much more than made up by interest receipts of $13,193,644 on the advance payments, and receipts of underwriting fees of $7,389,000 on guaranteed loans.

Government To Acquire Majority Shares in British Steel Firms

Revises plans for obtaining large measure of public ownership. Purchase of shares will be compulsory at prices fixed by arbitration. Government will provide capital for development. Enabling bill expected early next year

BIRMINGHAM, ENG.

FURTHER developments have taken place in regard to the government plans for the British steel industry. Present indications are that the government has accepted the revised plan prepared by the minister of supply to obtain a considerable measure of public ownership.

The government will not nationalize, as it first contemplated doing, certain branches of the industry. Instead, it will set about acquiring in the principal iron and steel companies a majority of the shares. With the voting power so insured, most of the directors in each company will be nominees of the government. For these purposes an enabling bill giving wide powers will be necessary, and the expectation is that its terms will be published in the early months of next year, though when and where it will be fitted into the legislative program has not yet been decided.

The government intends to provide considerable sums for the development of the industry, and this will be in the form of additional capital that will be held by the state. Such other shares as are needed to give control will be purchased compulsorily at prices to be fixed by arbitration.

However, on Sept. 22, Herbert Morrison, Lord President of Council, confirmed the government's intention of socializing an appropriate area of the iron and steel industry.

Production Rate Above Last Year's

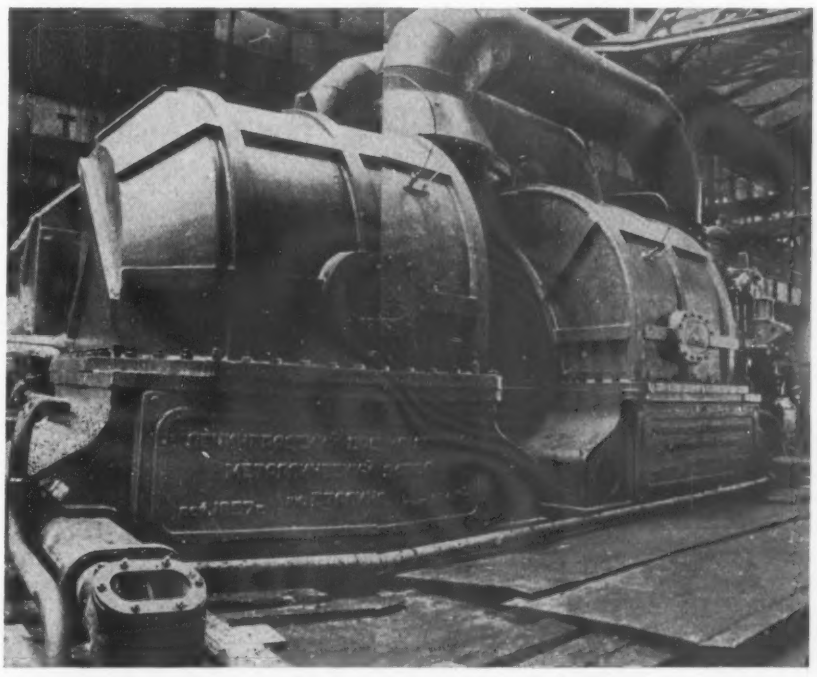
Production in August was lower because of the holidays but was considerably above the same month last year. Steel was at the rate of 11,747,000 tons a year compared with 9,465,000 tons in the like month last year; pig iron was at 7,558,000 tons compared with 6,358,000 tons.

Supplies of steel are totally inadequate to meet demand and export orders have been curtailed. Manufacturers cleared as much as possible in September in anticipation that export quotas will be reduced further during the fourth quarter. The reason is that priority claims for home industries are so heavy that there is only a small surplus left for shipment. Automobile builders may have to cut production owing to shortage of sheets. The British Iron & Steel Federation which operates distribution for the government has sent a letter to all sheet producers indicating that sheetmakers appear to be fully booked for many months to come, although many requirements which government policy insists on being met are still waiting to be placed for early delivery.

Sheet rollers are in an unenviable position for while they have insistent demands from the automobile builders they are expected to provide sheets for housing to an increasing extent, this being regarded as priority No. 1. Steelworks are also heavily pressed for plates, sections and bars. Construction engineers are keen to secure delivery of material for rebuilding factories and business premises destroyed by enemy action.

A contract has been placed for the rebuilding of the House of Commons. Structural steelwork comprising 1200 to 1300 tons has been awarded to Redpath Brown & Co. Ltd. who will fabricate it in their London works at East Greenwich. Dorman Long & Co. Ltd., Middlesbrough, are building a new £500,000 power plant, and construction has also begun on a new central ore unloading and ore preparation plant at a cost of £1,250,000. The latter scheme will serve the Dorman Long project for a new steelworks and universal beam mill on a virgin site between the company's works at Cleveland and Redcar on the northeast coast. Approximately 2400 tons of steel will be used in the construction of the boiler plant itself and another 1000 tons of structural steel framework in the power house building.

The position in the light foundries is still difficult owing to the shortage of skilled labor, a problem which is facing industrialists all over Britain. Total foundry capacity is not yet absorbed despite the fact that housing requirements for castings are at a level higher than for many years. Deliveries of pig iron from the furnaces are strictly controlled on a quota system and users cannot always get what they require. It is clear that when 100 per cent working becomes possible in the foundries making light castings a bigger tonnage of iron from the furnaces will be needed. Power plant producers are seeking heavy castings and steel pressings. Works making heavy castings have added considerably to their order books in recent weeks and work is assured to the end of the year at least.



RUSSIANS BUILDING TURBINES: Recently constructed by the Stalin Metal Plant at Leningrad was this 100,000 kilowatt high-pressure turbine, the first of its type to be built in Russia. NEA photo

1946 Truck-Trailer Production To Se

Output this year is expected to reach 60,000 units, compared with 41,869 in 1941, the previous record for civilian trailers. Some makers have considerable backlog of orders while others have fairly sizable inventories of some types

By VANCE BELL
Associate Editor, STEEL

NEW MILEPOST in civilian production is expected to be passed this year by the truck-trailer industry which in the first seven months of 1946 nearly equaled the all-time year record set in 1941.

With output for the first seven months averaging better than 5500 units a month, the industry is anticipating total production this year of at least 60,000 truck-trailers, compared with the 1941 record of 41,869 civilian units.

For the industry as a whole, supply of new trailers is approximately in line with demand. However, some manufacturers have substantial order backlogs for certain types of trailers, while others may have a fairly sizable inventory of certain types and models. That the supply is not less comparable to demand results from the fact even during the war the truck-trailer industry continued civilian trailer manufacturing, although at a reduced rate.

Production this year of 60,000 truck-trailers would represent sales value of approximately $140 million, according to the Truck-Trailer Manufacturers Association Inc., Washington.

Output in the first seven months of 1946 totaled 38,940 units, the U. S. Bureau of the Census reports. The bureau's latest data are based on reports from 114 manufacturers, all of the known companies in the industry. Monthly production figures for the first seven months of 1946 follow: January, 5323; February, 3898; March, 5412; April, 6691; May, 6617; June, 5033; and July, 5966.

July production exceeded shipments by 411 units. Value of the July shipments was $11,153,809.

Approximately half of the industry's production is comprised of vans, which classification consists of the following five types: Insulated, refrigerated, furniture, ordinary closed top trailers, and open top. Of those five types, the ordinary closed top trailers comprise approximately 75 per cent of the vans and about 38 per cent of the total truck-trailer production. The remaining 62 per cent of the production is accounted for by eight classifications, no one of which equals the vans group. Among those eight classifications are racks, tanks, pole and logging, platforms, and dump trailers.

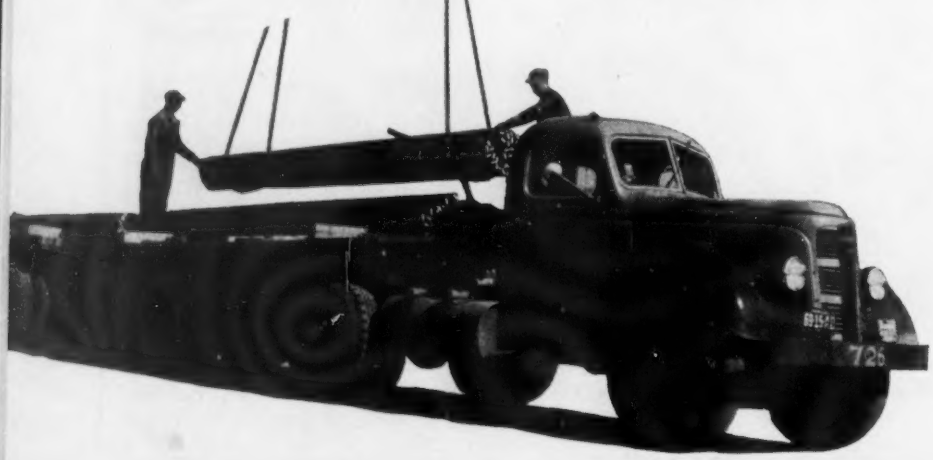
Although the estimated 1946 production of 60,000 truck-trailers would set a new record for output of civilian units it would be only 28 per cent of the combined output of civilian and military truck-trailers in 1944. That year, civilian units totaled 24,092, while military truck-trailers numbered 185,349. Nevertheless, the demand for civilian truck-trailers has made a substantial growth in the past decade, as the following figures testify:

TRUCK-TRAILER PRODUCTION

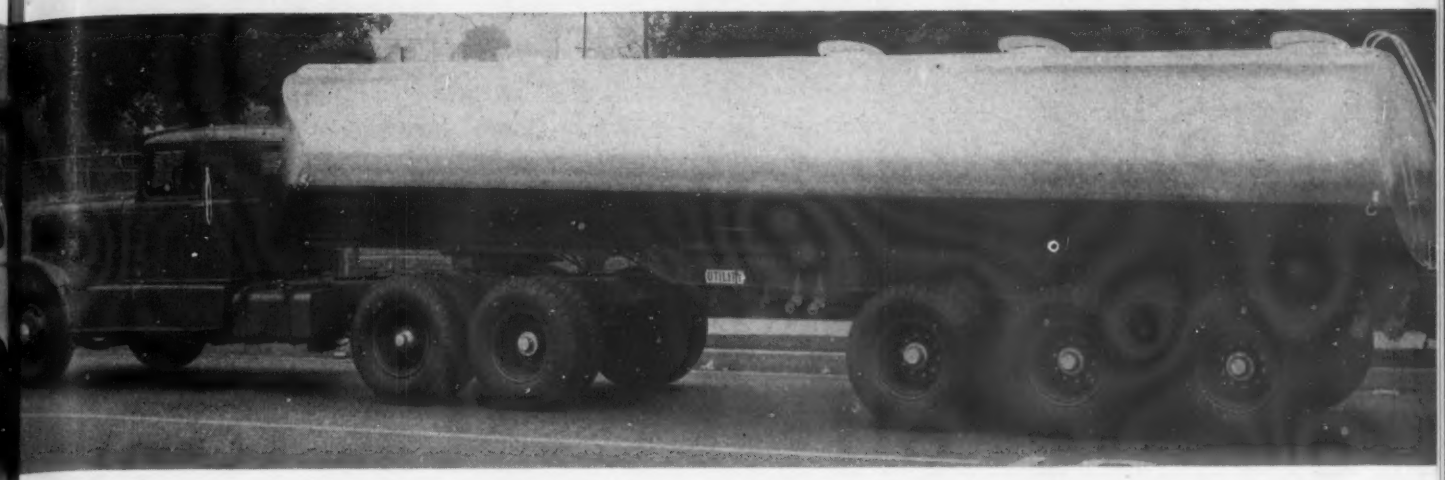
Year	Civilian	Military
1935	18,898	.....
1937	21,747	.....
1939	24,182	.....
1940	27,118	.....
1941	41,869	
1942	8,408	71,520
1943	8,054	188,811
1944	24,092	185,349
1945	33,266	83,967
1946	60,000*	.....

* Estimated

Of 114 truck-trailer manufacturers only about a dozen can be considered large companies. From 25 to 30 could be considered medium to small com-



Truck-trailers are used widely for speedy movement of steel (photo at left) directly to plants and sites where it is to be used



Illustrative of a type of truck-trailer whose popularity is increasing in states which allow truck-tractor, semitrailer and full trailer combinations are the milk tank truck-trailers in the picture at the left. Typifying the versatility of which the highway transportation industry boasts, this "double bottom" type of vehicle allows considerable flexibility in that either trailer can be "spotted" for loading or unloading and the remaining one taken to another destination. Either trailer can serve as a full trailer when used in connection with the converter dolly. An outlet for additional steel is provided through manufacture of the increasingly popular three-axle type semitrailer (photo at the right) which requires more materials than previous smaller models with fewer axles

New Mark

panies, and the rest may be assumed to be very small manufacturers, or companies which make a few trailers along with some other product.

Current figures on total employment in the truck-trailer manufacturing industry are not available but a survey made a year ago indicated an approximate total of 25,000 hourly workers. The Truck-Trailer Manufacturers Association said that unquestionably the industry's employment has increased somewhat since that survey.

In attaining the current high rate of production of civilian truck-trailers the industry has been face to face with the problems of materials shortages, low productivity of employees, shortage of skilled labor, and work stoppages.

Commenting on the outlook for truck-trailer production this year, Julius L. Glick, president, Truck-Trailer Manufacturers Association, said: "Trailer makers will have hurdles to clear, of course, but suppliers of parts and components still assure us they can overcome their own difficulties sufficiently to allow us to produce the indicated number of finished units.

"While suppliers foresee inability to increase present schedules much, if any, for several months," said Mr. Glick, "important sources have told us they can continue past schedules on such items as power brakes, brake linings, wheels, rims, steel tubing, bearings, leaf springs, and axles."

One of the possible limiting factors seen by some suppliers is the acute shortage of pig iron vitally needed for castings, Mr. Glick pointed out.

"It may be said, on the basis of supplier reports to our association, that trailer manufacturers will not be able to pick and choose from surpluses of materials, but that, on the other hand, the prospect is for a continuance of at least as good a flow of materials and parts as the trailer industry obtained in the first half of this year," Mr. Glick added.

With production of truck-trailers expected to reach a new high in 1946, consumption of steel in the industry would total 190,000 tons, the greatest amount ever consumed in the manufacture of civilian truck-trailers. The amount of steel currently being used represents even more of an increase than the rise in the number of trailers being built would indicate. This is true because revisions in some state laws permit longer trailers and, in a large number of states, tandem axle trailers, both of which require considerably more steel and other materials now than before the war.

The steel consumption figure of 190,000 tons for 1946 was arrived at by the Truck-Trailer Manufacturers Association through a series of calculations using the material weights per trailer developed by the War Production Board when materials were under wartime controls.

Now that stainless steel is available again, several manufacturers of truck-trailers have resumed offering trailers of stainless construction. Prior to the war, stainless steel had been used to some extent in construction of van trailers, refrigerated and insulated trailers, and milk tank trailers.

The use of refrigerated trailers is increasing very rapidly. This comes about from the large increase in frozen foods and other food products requiring close temperature control and also as a result of considerable technical progress in the design and construction of refrigeration units. Prior to the war, there were relatively few dependable lightweight refrigeration units available for trailers. Now, however, there are a number of such units, and while production of these units is booming, it is far below the demand.

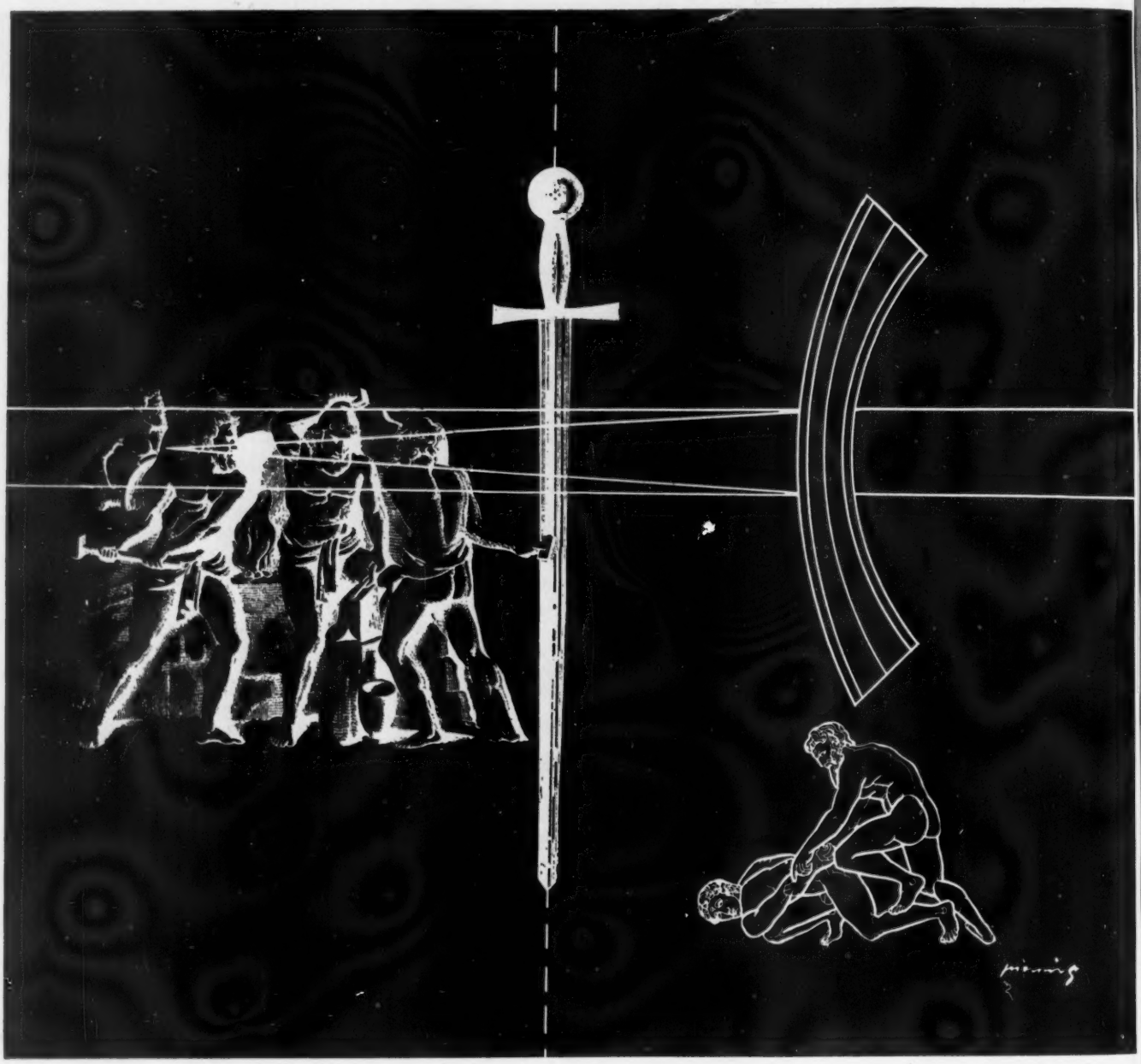
In developing and improving motor truck transportation, those interested in it have had to deal with a great variety of state laws, many of which intentionally discriminated against highway transportation. The chief difficulty with existing state laws, according to Mr. Glick, is that some of them cut across or hamper the natural flow of commercial traffic. In each such instance, the "low size and weight state" necessarily sets the ceiling for the region in which it is located. Although much progress has been made in recent years in removing discriminatory and intentionally restrictive state legislation hampering highway transportation, much still remains to be done, Mr. Glick declared.

Nevertheless, the motor truck transportation industry with its many and varied truck and trailer units, some highly specialized and all possessing high adaptability for different services, has confidence that its future is bright. An indication of this confidence is the construction now under way of a $7½ million truck-trailer assembly plant at Avon Lake, O., by the Fruehauf Trailer Co., Detroit. In this new half-mile-long plant, mass assembly techniques will be applied to building of truck-trailers.

ONE CAME BACK

One of the legends surrounding the making of Damascus sword blades is that the smiths developed a delayed quench consisting of thrusting the heated blade into the body of a slave. This gave the required properties, but it was prodigal of manpower, and inconvenient besides. The smith usually had to leave town to do his heat treating in quiet.

Today, metallurgists can obtain properties they need in steel by simpler, less improvident means. A little molybdenum is one way of doing this. It is a proved means of obtaining the hardenability that assures good performance in service. Practical working data on molybdenum steels are available from Climax upon request.



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By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Fairness of certain government statistics questioned by General Motors labor economist. Federal Reserve Board industrial production index cited as example of statistical magic in its treatment of automobile output data

DETROIT

OLD ADAGE to the effect that figures cannot lie but liars can figure may not fit exactly in the case of many current government statistics, but it comes close. The shocking example of the famous Wallace report from the Department of Commerce on automotive wage-price relationships is a case in point, and despite its official repudiation by the ex-secretary, it is still vigorously supported by Department of Commerce underlings. The auto industry may shortly have something to say about this.

Andy Court, General Motors labor economist, took a few verbal swings at the fairness of some other government statistics in a recent New York address, specifically the Federal Reserve Board index of industrial production which sets July automobile production 78 per cent above the 1935-39 average. Actual production in July was about 300,000 cars and trucks, compared with an average of 335,000 for the 1935-39 period. Instead of up 78 per cent, actual output was down 10 per cent.

Man-Hours Determine Index

The way this neat trick is accomplished by Washington slide-rule artists is to develop an index based on the number of man-hours for which the employer pays wages. Thus, the slower the working pace, the less production turned out per hour, the higher the production index goes. Paid lunch periods, paid sick time, pay for smoking on the job, call-in pay and the other methods of remuneration for not working forced upon industry almost at the point of a gun in recent years all contribute to moving the official government production index up, but sadly they do not turn out any more automobiles.

The procedure, according to Court, is not untypical of government index making and is in part the result of the Department of Labor policy of defining man-hours and payrolls in industry so that the official average hours of work appear high and, as a consequence, average hourly earnings show less increase than actually exists. Observes Court: "People waiting for new cars can't ride on government statistics."

Assemblies of cars and trucks have been holding on fairly even keel for the past three months at around 350,000 units, U. S. and Canada. Considerably short of earlier projections, the performance is causing more than a little embarrassment in industry circles. In the first place inventories are seriously unbalanced, and in the second place there is an overloading of management and supervisory personnel which is even now in the process of correction.

Inventories of many purchased parts, subassemblies, manufactured parts and components are far in excess of the requirements of the present level of production. They are this way because the industry has been following a policy of buying anything and everything it could lay hands on, for two principal reasons: First as a cushion against further strikes and work stoppages in suppliers' plants, and second to meet the requirements of double-shift operations which most companies have been planning but have not realized because of shortages of a few critical items and a near-term deficiency in shipments of flat-rolled steel. As long as the latter continue—and there is little support for opinion they will not—inventories of other parts will continue far out of balance and this may have some interesting repercussions in buying policies. If there should be an appreciable cutback in the buying of parts and materials which are in long supply there might be some early retrenchment in steel requirements for such parts, and this could be reflected quickly in opening up of the steel market. Easing of pressure probably would come first on bars and products other than sheet and strip.

Obviously in a period of rising prices the industry cannot become too worried about a long inventory position on parts if they are eventually usable. Scaling back purchases might in addition help to relieve the drouth in replacement parts which, despite enormous shipments, seem unable to fill the demand. For example, one of the largest car and truck builders delivered to dealers in the first half of the year $7,593,850 worth of replacement parts and $4,886,617 in accessories, representing an increase of 116 per cent in service parts.

On the question of nonproductive labor, as mentioned here a couple of weeks ago, it is accounting for much too high a proportion of unit costs. For one thing, all companies have had hundreds of expediters running around the country chasing materials and parts. Little thought has been given to shipping costs and airlines have reaped a bonanza in air express on parts to keep automotive assembly lines going. Beyond that, during the war supervisory and managerial staffs of most companies were built up, both in numbers and in salaries, to an important degree, a necessary step in view of the size of the job to be done. It is not so easy to cut down after the build-up, but it is now beginning to appear inevitable. Double shift operations have not matured, labor and material costs have mounted to the point where profit margins are evanescent. The ax will have to fall on this nonproductive labor.

Downgrading, Salary Cuts Suggested

Two obvious methods suggest themselves. One is outright salary reductions; the other is downgrading. Probably the latter will be the choice. As a matter of fact, some adjustments already have been made in the ranks of most General Motors divisions, although the nature and extent have not been announced.

Another casualty this year for most industrial companies will be management bonuses, in view of slim or nonexistent profits and the reported policy of internal revenue in disallowing such bonuses as a cost item. For many, however, bonuses have meant simply that much more for

Automobile Production

Passenger Cars and Trucks—U.S. and Canada

Tabulated by Ward's Automotive Reports

	1946	1941
January	121,861	524,037
February	83,841	509,332
March	140,777	533,878
April	248,318	489,856
May	247,620	545,321
June	214,511*	646,278
July	330,764*	468,897
August	364,046*	164,793
September	345,250*	248,751
Estimates for week ended:		
Sept. 14	88,888	53,165
Sept. 21	80,972	60,615
Sept. 28	85,572	77,035
Oct. 5	90,000	76,820

* Preliminary

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RADIO TELEPHONE EQUIPMENT: Installed in a Chevrolet panel truck this equipment permits driver to make and receive local and long-distance calls to and from any Bell System or connecting telephone units in the United States or overseas. The service, developed in the Detroit area by engineers of the Michigan Bell Telephone Co., is an application of frequency-modulation radio principles in the very high frequency range, equipment consisting of a receiver, transmitter, antenna, selective signaling device, instrument holder and handset. An amber light and bell under the dashboard of the truck indicate when the telephone operator is attempting to contact the truck. Equipment is leased to the user, with an installation charge and a monthly rental charge

the income tax collector, so in the final analysis the Treasury Department is the chief loser.

Jet Propelled Boat Seen

"Hydropulsion," or the propulsion of boats by high velocity water jets, was demonstrated here last week by the Gray Marine Division, Continental Motors Corp. The idea is still in the experimental stage and will not be offered to the public in the near future, but it represents a revolutionary concept in the marine field. It is likened to jet propulsion in the aircraft field, since it involves the ejection of a solid stream of water at high velocity under the boat, exerting force against the water in which the boat rides.

Originator of the idea, as far as Gray Marine is concerned, is Keenan Hanley of Prospect, O., who nine years ago introduced a propellerless fireboat used in the Cincinnati flood of that year. This experimental unit was powered with a Continental engine driving a hydraulic pump of special design which was used both to propel the boat and to pump water. Later a 21-ft fireboat of similar design was delivered to the city of Wheeling, W. Va., and subsequently other cities purchased craft of this type.

Test boats using hydropulsion were shown to the press in Detroit last Tuesday, and John W. Mulford, president of Gray Marine, said the first application probably would be in the field now largely held by outboard motors, a typical installation involving possibly a detachable and portable inboard engine for use with a small hydraulic pump and nozzle unit suitable for the volume market.

Spectacular maneuvers are possible with water jet drive. Boats can turn in their own length, move sidewise, operate astern indefinitely and pass through weed beds and shallow water which would quickly foul a propeller. Further, they can be beached and backed off by flooding themselves under the hull like landing boats.

Lincoln Work Orders Placed

Work orders are placed for a $2 million modernization program at the Lincoln plant of Ford Motor Co. Main office is already undergoing changes, while the plant alterations are scheduled to start around Nov. 1, to be carried on without interference to present production schedules. The program is designed to double present capacity.

Announce K-F Car Prices

Speculation is heard as to the impact of OPA-approved price ceilings on the million or so buyers who have placed orders for Kaiser and Frazer automobiles. Detroit delivered price on the Kaiser Special, including all taxes, delivery and handling charges, but with only standard equipment, is calculated as $1850.41, while the Frazer will retail on the same basis for $2008.93. These figures are far in excess of what the K-F partners originally hoped for, but they show the effects of higher material and manufacturing costs in the industry. Assemblies at the Willow Run plant are now running something over 60 per day.

Car Needs 6 Tons of Coal

How much coal to make an automobile? Ford statisticians estimate 6 tons per car, figuring coal used in coke ovens, power house and the railroads of the Rouge plant, plus that used by steel suppliers and in transportation of raw materials.

Willys Display Derided

When told of the elaborate three-dimensional exhibits illustrating the functioning of the national economy, unveiled last week in Toledo by James D. Mooney of Willys-Overland at his big party, certain of the General Motors economic specialists snorted and said, "Hell, that is the same stuff we built for him 15 years ago." It seems a guy just can't introduce any idea without some deflaters coming along.

Speaking of Willys-Overland and the new stress its management is laying on utility and economy in automotive transportation, one wonders how much economy the average buyer will see in the new jeep station wagon which has been assigned a ceiling price of $1407.

New Tucker Terms Revealed

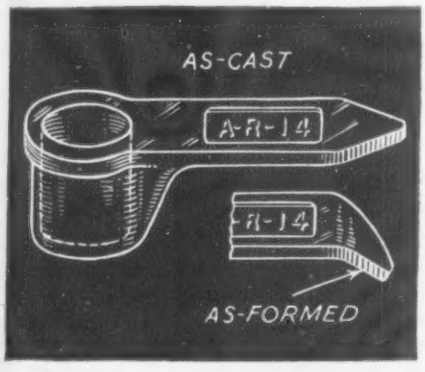
New lease terms have been approved by the WAA for the Dodge Chicago plant in which the Tucker Corp. is planning a car building program. Contingent upon proof of sufficient financial backing by Mar. 1, rental of the plant has been reduced to $500,000 annually for two years, starting next March, and $2.4 million thereafter on a ten-year lease with option to purchase for $30 million. Tucker is understood to be negotiating currently for a $20 million securities issue.

See what the other fellow... is doing with DIE CASTINGS

ODD SHAPES—CAST OR BENT

One of the principal advantages of the die casting process is the ability to cast unusual shapes. There are instances, however, where it is more economical to obtain a required contour by a bending operation *after* casting.

A design change in the *zinc alloy* die casting shown below required that the end of the pointer be curved, instead of straight as it was originally cast. This could easily be accomplished by altering the die but, thanks to the ductility of the zinc alloy, it proved to be less costly and quite satisfactory to bend the pointer after casting. There are many cases where a simple forming operation of this kind will prove to be more economical than to cast a shape which will involve high die cost or slow up the casting cycle.

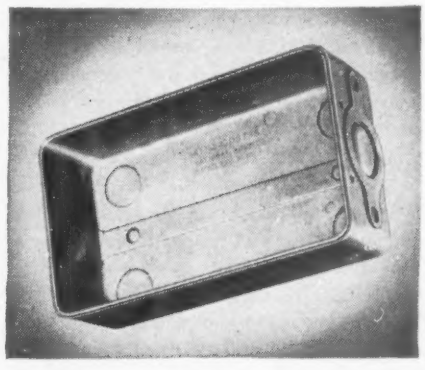


KNOCKOUTS ARE OFTEN PROVIDED IN DIE CASTINGS

Knockouts—thin sections which are later punched out to provide openings—are frequently provided in die castings. The designer of such a part will do well, however, to attempt to so locate the knockouts that they will not constitute undercuts which will interfere with the ejection of the casting from the die.

The *zinc alloy* die cast switch box below has eight knockouts to provide various openings for conduits and screws depending upon the particular type of installation. Six of these knockouts are in the bottom of the box and, since they are parallel to the die parting, they do not constitute undercuts. The knockouts at either end of the casting, however, require the use of slides having about ⅛" motion to clear the casting when it is ejected.

Naturally, the slides necessitated a more expensive die and there is some extra flash to be removed from the castings, but the knockouts are absolutely essential at these points and the extra costs were justified on this score.



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A Few Words About This Advertisement

This is the first advertisement in a new series which will appear in these pages during the months ahead. Because of our close association with the die casting industry, many interesting design and application ideas come to our attention. We propose, in these advertisements, to pass these ideas along to you to help in the solution of some of your problems. Watch for these ads and, in the meantime, ask us—or your die casting source—for a copy of the booklet "Designing For Die Casting"

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Discusses Basis For Success in Export Business

President of United States Steel Export Co. emphasizes need for having thorough understanding of exporting

SUCCESS of an export business depends on two fundamental organization requirements, George W. Wolf of New York, president, United States Steel Export Co., told the Management Division of the American Society of Mechanical Engineers last week in Boston.

Those requirements, he said, are a thorough understanding of the nature of foreign trade, and a particular and specialized knowledge of the specific branch of export that a prospective exporter is considering entering.

Discussing the nature of foreign trade, Mr. Wolf pointed out that not all regions or nations are favored equally as to resources, manpower, climate, and location of centers of production, and stated that a nation should therefore, with the exception of uneconomic activities vital to its defense or protection, produce only the commodities or services it can manufacture or supply most cheaply.

"Peoples of nations poor in resources will produce less wealth with their efforts than the people of rich nations, but if they avail themselves of the opportunities of foreign trade, the volume of goods available to them through exchange will be far greater than if they attempt to produce all things," Mr. Wolf said.

Striking at the well-established belief that a nation should sell more than it buys, Mr. Wolf stated that imports are more beneficial to the economy of a nation than exports. "After all," he pointed out, "the final purpose of organized industry and commerce is to place at the disposal of man the largest possible amount of needed and desired economic goods. This optimum level in the enjoyment of wealth can be attained solely through imports of foreign commodities and services," he declared.

Steel Distributors Form New West Coast Chapter

Formation of a new Pacific Coast chapter of the Association of Steel Distributors Inc. was announced recently by Mauray I. Cohen, president of the association. The new chapter's activities will cover northern California and the Pacific Northwest area.

Officers of the new group are: Philip Scheibner, Associated Iron & Metal Co., Oakland, Calif., chairman; Hans Popper, California Iron & Metal Co., San Francisco, vice chairman; P. W. Keen, Los Angeles, secretary; and Harold Levin, Salco Iron & Metal Co., San Francisco, treasurer.

BROADCASTS GOOD NEWS: Clarence B. Randall, vice president of Inland Steel Co., Chicago, and chairman of the National Association of Manufacturers' committee on industrial relations, is shown rehearsing the script for the "Good News About Jobs" broadcast recently over an NBC hookup

BRIEFS . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

American Stove Co., Cleveland, has purchased a plant in Cleveland containing over 250,000 square feet of floor space which it will use for production of heavy duty cooking equipment. The plant was formerly operated by Ohio Crankshaft Co., Cleveland.

—o—

Wire Division, North American Philips Co. Inc., New York, recently moved from Dobbs Ferry, N. Y., to Lewiston, Me., where all its wire drawing, enamelling and plating operations will be conducted.

—o—

Carnegie-Illinois Steel Corp., Chicago, is sponsoring courses in metallurgy of iron and steel and in general accounting principles for its employees in co-operation with Illinois Institute of Technology and Indiana University.

—o—

Miller Motor Co., Chicago, has appointed the following as sales representatives: P. W. Rice, Cleveland; Pump Engineering Co., Seattle; Gordon Equipment & Supply Co., Pasadena, Calif.; and Mutual Industrial Supply Co., Detroit.

—o—

Stanford Research Institute, Stanford University, Calif., has been organized by Stanford University to engage in research for all types of industrial problems.

—o—

Pacific Fruit Express Co., San Francisco, has developed a new-type lightweight railroad refrigerator car which has metal alloy exterior sheathing.

—o—

Aluminum Co. of America, New York, has designed, and the Bethlehem Steel Co. plant at Rankin, Pa., has fabricated, an all-aluminum bridge span which has been installed on the new Grasse river

bridge of the Massena Terminal Railroad at Massena, N. Y. The 100-foot span weighs only 53,000 pounds compared to 128,000 pounds for a similar steel span.

—o—

Alliance Tool Co., Alliance, O., has incorporated and will continue in the general tool and die business and in addition will enter into the manufacture of special carbide cutting tools. Doubling of present plant facilities is contemplated.

—o—

Payne Cutlery Corp., Brooklyn, N. Y., has purchased Compton Shear Co., Newark, N. J., which plans expanded operations as a subsidiary.

—o—

Greenlee Bros. & Co., Rockford, Ill., has produced a 16mm sound movie showing construction and operating features of its 6-spindle automatic screw machine.

—o—

United States Rubber Co., New York, has purchased the outstanding common stock of Dispersions Process Inc., New York, whose activities will be joined with operations of Naugatuck Chemical Division of the rubber company.

—o—

Mitchell - Bradford Chemical Co., Bridgeport, Conn., has been appointed exclusive distributor of Iridite in the New England area by Rheem Research Products Inc., Baltimore.

—o—

York Corp., York, Pa., has announced three new models of room conditioners designed particularly for air conditioning homes and small offices.

—o—

Permutit Co., New York, manufacturer of water conditioning equipment, industrial ion exchangers and power plant specialties, has acquired Simplex Valve & Meter Co., Philadelphia.

—o—

Denison Engineering Co., Columbus, O., has appointed John C. Eide Co., Minneapolis, as its dealer for Minnesota and western Wisconsin.

—o—

Heppenstall Co., Pittsburgh, has moved its Philadelphia office from the Drexel building to Room 1446, Broad Street Station Bldg., Philadelphia 3.

—o—

General Electric Co., Schenectady, N. Y., has purchased from Reconstruction Finance Corp. the Ft. Wayne, Ind., plant where GE produced turbosuperchargers during the war. The plant, bought at a cost of $5 million, will be used to produce fractional-horsepower motors.

—o—

Superior Foundry Inc., Cleveland, has acquired Superior Foundry Co., that city, and will continue production of gray iron castings.

—o—

Climatic Control Corp., Baltimore, has acquired the plant formerly occupied by Eberts Sheet Metal Co., that city, and will use it for sheet metal fabrication.

—o—

Fruehauf Trailer Co., Detroit, has begun production of light-weight, welded steel and aluminum doors for trailers.

—o—

Landis Tool Co., Waynesboro, Pa., has opened an office at 3091 Mayfield Rd., Cleveland 18.

Indian Motorcycle Steps Up Output; Plans New Line

Orders for motorcycles and parts held by Indian Motorcycle Co., Springfield, Mass., approximate $5 million or 10,000 units, and with the release of a new sport scout model motorcycle shortly, total production for the fiscal year ending August, 1947, is expected to be about 15,000 units with a sales volume of more than $9 million. Production schedules are geared to 1250 motorcycles a month.

The company also manufactures a power lawn mower, demand for which has increased 300 per cent, and plans a mass production line for mowers, cutting units, tractors and allied equipment, as well as roto sweepers for industrial use. The company has recently purchased a Springfield war plant, which was operated by Reynolds Metals Co., Richmond, Va.

Foundrymen Name Members Of Cupola Research Group

Appointment of the 1946-47 cupola research committee of the Gray Iron Division, American Foundrymen's Association, has been announced by T. E. Eagan, Cooper-Bessemer Corp., Grove City, Pa., division chairman.

R. G. McElwee, manager, Iron Foundry Division, Vanadium Corp. of America, Detroit, will continue as chairman of the committee, with A. E. Schuh, director of research, U. S. Pipe & Foundry Co., Burlington, N. J., as vice chairman. E. H. Stilwill, chief metallurgist, Dodge Division, Chrysler Corp., Detroit, will act as secretary.

Other members of the new committee are: A. L. Boegehold, chief, metallurgical department, General Motors Research Laboratories, Detroit; H. Bornstein, director of testing and research laboratories, Deere & Co., Moline, Ill.; and E. C. Jeter, foundry metallurgist, Ford Motor Co., Dearborn, Mich.

Ease Controls, Refrigeration Industry Asks

Manufacturers of refrigeration equipment request government to give them priority status for materials

EASING of restrictive regulations hampering production of urgently needed mechanical refrigeration equipment has been requested of the Civilian Production Administration by the condensing unit section of the mechanical refrigeration industry.

Warning that serious unemployment and widespread spoilage of food will result unless restrictions are eased immediately, the condensing unit manufacturers asked that they be given a materials priority status in relation to their essentiality to the national economy.

The appeal of the condensing unit manufacturers followed a recent statement by H. F. Spoehrer, president, Refrigeration Equipment Manufacturers Association, Chicago, who warned that the entire mechanical refrigeration industry may be forced to close because of restrictive government regulations.

"The government seems bent on pushing the veterans' housing program at the expense of all other industries, regardless of their essentiality to reconversion and the welfare of the people," Mr. Spoehrer said. "Even if the CPA directives would have the effect of expediting construction of veterans' homes, and there's no reason to believe they will to any great extent, nothing will be gained if the veterans are laid off from the jobs which provide the earnings for them to buy new homes," he added.

Mr. Spoehrer pointed out production of mechanical refrigeration equipment needed for preservation, protection and transportation of food already is being delayed because of the shortage of pig iron and castings.

Transformer Firm Moves Factory to Canonsburg, Pa.

Pennsylvania Transformer Co., Pittsburgh, has purchased from the War Assets Administration two buildings of the aluminum forging plant in Canonsburg, Pa., 20 miles from Pittsburgh, and will use them to house all manufacturing divisions and many offices of the company.

A few departments, including sales, will remain in Pittsburgh.

Expansion Pushed by U. S. Steel

Projects on coast moving rapidly ahead despite delays occasioned by materials, equipment and labor shortages

SAN FRANCISCO

U. S. STEEL Corp.'s expansion program in the Far West is moving forward rapidly despite occasional and frequently bothersome delays caused by materials and labor shortages. Newly acquired properties are being co-ordinated and integrated with older operations, and construction of new facilities is being pushed as rapidly as possible.

As examples of how U. S. Steel is broadening its position on the West Coast are these developments as outlined by officers and directors of the company on their recent visit to San Francisco:

The Geneva plant in Utah is preparing to convert the plate mill into a wide hot strip mill as soon as equipment can be obtained. Orders have been placed for mechanical and electrical equipment, but deliveries from suppliers may not be completed for another 15 months. Meantime, the plate mill will continue production. Most of its production now is going into plates for fabrication into large diameter pipe and tanks. Some material is being exported, chiefly to South America.

The structural mill at Geneva, which now is not being operated, is expected to begin production some time this fall.

Still scheduled for construction at the Geneva plant as soon as practicable is a mill to produce hot rolled coils for the new tin plate mill being built at Pittsburg, Calif.

Effective last Oct. 1 all of U. S. Steel's mining and manufacturing operations in Utah were integrated under Geneva Steel Co. management. This centralization brings Columbia Steel Co.'s operations at Ironton under control of the Geneva company. The Ironton plant will continue to be operated, and there is no intention of closing it so long as there is an adequate market for its products, officials said. President William A. Ross, of Columbia Steel, said Ironton has orders on hand for the next six months and foresees a continuing heavy demand.

DISCUSS STEEL SUPPLY: Irving S. Olds, left, chairman of United States Steel Corp., B. F. Fairless, center, U.S. Steel president, and William A. Ross, president of Columbia Steel Co., tell newspapermen at Los Angeles that some months will elapse before steel supply equals demand

Indicating that further expansion of of operations in Utah will depend on the extent of growth in the western market for steel, Benjamin F. Fairless, president, U. S. Steel, said current budgeted expenditures for new facilities can be considered to be a minimum, not necessarily a maximum. "Diversification of products at Geneva is dependent entirely on the market," he said.

Mr. Fairless also expressed hope and confidence that full-scale operations at Geneva would promote growth of a large number of other industries, chiefly fabricating plants.

"We will certainly do all we can to encourage such a development as the best customer we can have is the one in our own backyard."

Mr. Fairless also is confident that present railroad freight rates on steel from Geneva to the West Coast will be reduced from the present level of $12 a ton. However, he did not estimate what amount of reduction will be granted. Geneva asked for rates of $8 a ton. If such a level is granted, the West Coast will be given lower-priced steel than it has ever had, a factor which officials of the corporation expect will greatly expand manufacturing operations of many present and new plants on the coast.

Aside from shortages of equipment needed to complete new plant additions, Geneva is experiencing a scarcity of railroad cars to carry coal and iron to the mill. There also is a shortage of labor in some classifications.

The new sheet and tin plate mill now being built at the Columbia Steel plant at Pittsburg, Calif., is expected to be in production by this time next year.

Construction on the first multiple story steel-framed building to be built in San Francisco since 1941 is under way. It is the Matson building in downtown San Francisco.

The framework is being constructed with 800 tons of structural steel fabricated at the Alameda plant of Bethlehem Pacific Coast Steel Corp., and the frame is being erected by Bethlehem's fabricated steel construction division. The structure now being built will be seven stories high. However, the steel members have been designed to support eight additional stories which will be added later.

Plans for construction of 46 new industrial plants costing $21,241,500 in northern California were announced during August. In addition, 33 existing plants announced plans to expand facilities at a cost of $16,348,900.

The 12 counties of the San Francisco

Bay area account for 40 of the new plants and 24 of the expansions.

Announcement of new industrial developments in the Bay area since the first of the year greatly exceed those of last year. Through August there have been plans for 425 new plants costing $40,524,625 and 328 expansions valued at $52,696,165, making a total of 753 projects with a value of $92,220,790. In the first eight months last year the total number of new plants and expansions was 359 projects at $62,567,700.

Because of materials shortages, a number of the plans are being held in abeyance until scarcities abate.

Westerners Told Shortage Of Steel Is Unavoidable

LOS ANGELES

Steel shortages, which are the principal brakes on manufacturing and construction reconversion the nation over, are the unavoidable results of shifts from war to peace economy, a group of top flight steel men agreed last week in Los Angeles.

This was the opinion given by Benjamin F. Fairless, president, U. S. Steel Corp., Irving S. Olds, board chairman, and others on a tour of company properties in the Los Angeles industrial area.

Electrical appliance supplies are behind demand from 12 to 18 months because of strikes and OPA controls, John H. Ashbaugh, president and manager, Westinghouse Electric Corp., Appliance Division, said last week in Los Angeles.

Copper mining operations are due to begin soon within 10 miles of Riverside, Calif., it was reported last week by Kenneth J. Hines and Donald V. French, mineralogists. They said they have taken 10 claims in the area and that the ore is of sufficiently high grade to be loaded directly to smelters without preliminary milling.

Eighty-five per cent of the lessors of government-owned industrial plants in southern California intend to buy the plants they operated under government ownership, George J. O'Brien, chairman, Los Angeles Chamber of Commerce, Industrial Development Committee, reported last week.

He explained that during the war the federal government invested approximately $175 million of the $450 million in new facilities against which the balance of $275 million was invested by private capital.

Thirty-three basic materials not previously produced in southern California are now in production. They include steel tubing, aluminum, basic copper shapes, powdered metals, abrasives, and tool steel.

Kaiser Says Fontana Steelworks Is Booked Well Into Next Year

West Coast industrialist, in booklet describing his war and postwar activities, says steel plant is operating at capacity. Holds operating cost, less abnormal fixed charges, is below or equal the average of all steelworks in the nation

FONTANA steelworks of the Kaiser interests is operating at capacity, with its output contracted to peacetime users well into 1947, according to a booklet just published by the Kaiser company and circulated to time with Henry J. Kaiser's appearance before the House Merchant Marine & Fisheries Committee investigating the World War II shipbuilding program.

Every major steel fabricator and distributor on the West Coast is a Fontana customer, according to the booklet. Also, it is stated revisions in rolling mills should be completed this year, and set for completion by June, 1947, are a pipe mill for producing half-inch to 4-inch butt-weld pipe, and cold-rolling facilities.

In addition to marketing a dozen byproducts, the Fontana works has contracted to furnish slag to a mineral-insulation manufacturer employing a new process, it is said. The Fontana plant's importance to western industry is stressed in the booklet, especially since steel shipments from the East have decreased.

During the war Fontana produced 1,209,000 tons of ingots, from which were rolled 547,000 tons of plates, 135,000 tons of shapes, 94,000 tons of shell steel and 17,000 tons of bars. Steel from the plant went into 230 ships, went for 155 mm and 90 mm and 8-inch shells, and 155,000 tons of ingot were shipped to England in 1943. The remainder went to various war uses.

Steel is being produced economically at Fontana, it is claimed. Present operating cost, without abnormal fixed charges, is said to be below or equal to the average of all steel plants in the United States, and it is further stated, that with needed improvements to correct war-built deficiencies, the plant will become one of the lowest-cost plants in the nation, and one located in its primary market.

California ore reserves in Eagle Mountain, owned by Kaiser, alone are sufficient to operate the Fontana works for over 50 years, it is claimed.

Postwar activities of Henry J. Kaiser are widespread. They concern operation of 28 enterprises, ranging from automobiles to aluminum, cement to chemicals, ships to steel, hospitals to housing. Kaiser-directed interests operate more than 50 plants, grouped in five major regional centers and producing 130 different products.

In aluminum the Kaiser interests operate three integrated plants with annual capacity equal to 70 per cent of total prewar annual consumption of this metal.

Kaiser is in the housing field with an ambitious program. This year he expects to build 2000 houses, while in 1947 he plans to erect 10,000. In this activity he operates at Los Angeles what is claimed to be the largest pre-assembly plant in existence, and also the largest woodworking plant west of Chicago.

Currently the Kaiser interests are producing automobiles at the Willow Run plant in Michigan but distribution still is only to distributors. Of total Willow Run production two-thirds are Kaiser Specials, one-third are Frazers.

Large-Scale Magnesium Operations

In addition to other activities the Kaiser interests plan large-scale magnesium producing operations. They have plants for this purpose at Permanente, Calif., Moss Landing, Calif., and at Natividad, Calif.

Kaiser entered the gypsum field in 1944 when he concluded an agreement with the Standard Gypsum Co. Inc.

The Permanente cement plant owned by Kaiser, and described as the largest in the world, is now operating at capacity for peacetime users.

Kaiser shipbuilding operations are continuing. Dry-docking, repair work and conversion have been carried on at Richmond Yard 3, and the Swan Island Yard, Portland, Oreg. From January, 1945, to July, 1946, approximately $38 million of ship-repairs were completed.

Military aircraft, aircraft subassemblies, stainless steel specialties, household appliances, automobile parts and miscellaneous aluminum products are being turned out at Kaiser's Fleetwings Division. Also Kaiser is operating sand and gravel plants at Pleasanton, Antioch, Upton, Felton and Oroville, Calif., and one at Seattle. In addition to producing plants he operates four major batching and ready-mix concrete plants on the West Coast, and several others in conjunction with building materials dealers.

Men of Industry

H. H. FAIRFIELD

THOMAS CRUTHERS

JAMES C. HARTLEY

Joseph A. Coffey has been appointed general traffic manager, Portsmouth Steel Corp., Portsmouth, O. Mr. Coffey began his career in the transportation field with the Louisville & Nashville Railroad and later was with the Missouri-Kansas-Texas Railroad. In 1915 he became associated with Southwestern Bell Telephone Co. and later with Missouri Portland Cement Co., St. Louis, where he was general traffic manager. From 1932 to 1935, Mr. Coffey engaged in private commerce practice and in 1935 joined Continental Steel Corp., Kokomo, Ind., handling all traffic matters for its three plants. He is a member of the American Iron & Steel Institute and has taken an active part in the National Industrial Traffic League. **J. B. Lee** has been appointed assistant general traffic manager of the Portsmouth company. Mr. Lee has had charge of the Portsmouth traffic office of Wheeling Steel Corp., Wheeling, W. Va.

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James C. Hartley has been appointed chief metallurgist, Barium Steel & Forge Inc., subsidiary of Barium Steel Corp., Canton, O. Mr. Hartley was director of research for Heppenstall Co., Pittsburgh. During the war, in addition to his duties as director of research, he served with the National Academy of Sciences, War Metallurgy Committee on Magnesium Forgings, Society of Automotive Engineers War Engineering Board, and Committee on Aluminum Forging Tests. Mr. Hartley will carry on his research work at Barium's Canton, O., plant.

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H. H. Fairfield has been appointed foundry consultant, H. W. Dietert Co., Detroit. Since 1940, he had been a metallurgical engineer with the Physical Metallurgy Research Laboratories of Canada, and conducted research and consulting work for Canadian manufacturers. His main interest was in the field of quality control in metallurgical processes.

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Thomas Cruthers has been elected a member of the board of directors, Electric Machinery Mfg. Co., Minneapolis, subsidiary of Worthington Pump & Machinery Corp., Harrison, N. J. Mr Cruthers is a vice president of the Worthington corporation.

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James P. Cunningham, vice president in charge of production, Luscombe Airplane Corp., Dallas, Tex., has been elected to the board of directors of the company. Mr. Cunningham joined Luscombe in 1942 as a member of its tool design department.

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Chester D. Jones has been transferred from the purchasing department of Diamond Alkali Co.'s general office at Pittsburgh to Houston, Tex., where he will become purchasing agent for the company's proposed new $5 million plant. He will have charge of purchases of all construction materials and equipment as well as processing and operating equipment for the new plant.

—o—

H. Russell Wilson has been appointed sales manager, Radiator Division, Perfex Corp., Milwaukee. Mr. Wilson joined Perfex 10 years ago and was named assistant sales manager in 1945. **Ernest H. Panthofer** has been named chief engineer of the division. Mr. Panthofer joined the company in 1941 and in 1944 was made staff assistant to **I. G. Bohrman,** vice president in charge of the division.

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A. P. Lerch has been appointed chief tool design engineer, Hyster Co., Portland, Oreg. Mr. Lerch, who has been with the company for six years doing tool designing and tooling work, will be in charge of all tool designing for the company's three plants. **R. W. Ager** has been appointed personnel manager of the company's Portland plant. He has been with the company for ten years, serving most recently as assistant export manager.

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Robert M. Arnold, president, Arnold Engineering Co., Chicago, a wholly owned subsidiary of Allegheny Ludlum Steel Corp., Pittsburgh, has been elected a member of the latter company's board of directors. Mr. Arnold, a graduate of Massachusetts Institute of Technology, served as secretary and chief engineer of the Arnold company from 1935 to 1941 at which time he became president. Previous to joining the Arnold company, Mr. Arnold had been chief engineer, Grigsby-Grunow Co., and later, chief engineer, Philco Corp. of Great Britain.

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George L. Ridgeway, director of economic research, International Business Machines Corp., New York, has been appointed chairman, Import Committee, World Trade Foundation of America Inc., New York. Mr. Ridgeway had been an assistant in the U. S. Department of State, 1942 to 1946.

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Charles L. Huisking Jr., recently released from the Army, has resumed his duties as treasurer, Aircraft Screw Products Co., Long Island City, N. Y., and has been appointed assistant sales manager of the company.

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Clarence G. Stoll, president, Western Electric Co., New York and **Oliver E. Buckley,** president, Bell Telephone Laboratories, New York, have been awarded the Medal for Merit, which is conferred

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by President Truman for "exceptionally meritorious conduct in the performance of outstanding services to the United States." Presentation of the medal was made by **Maj. Gen. Harry C. Ingles,** Chief Signal Officer, U. S. Army.

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Herbert L. Piasecki has been appointed office manager for Stearns Magnetic Mfg. Co., Milwaukee. He was with Color Print, Milwaukee. **Frank Brunner** has been promoted to superintendent of the Stearns company's brake factory. He was assistant superintendent of the main plant. **Curtis H. Stout,** of Little Rock, Ark., has been appointed sales representative for the firm, to cover the state of Arkansas.

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D. E. Golden has been appointed executive vice president, Schlage Lock Co., San Francisco. **Marron Kendrick** has been appointed vice president and secretary of the corporation.

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D. W. McNaugher Jr., vice president, has also been appointed treasurer, Robert W. Hunt Co., Chicago. **S. C. Sexauer,** assistant secretary, has been appointed secretary of the company.

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Elmer G. Davis has been appointed sales manager of the recently formed Buckeye Division, Cleveland, General Grinding Wheel Corp. The division will service the state of Ohio on General's vitrified, rubber and resinoid bonded wheels.

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G. A. Mueller has been appointed contracts director, Consolidated Vultee Aircraft Corp., San Diego, Calif. He will be in charge of both military and commercial contracts.

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George A. Hoopes has been appointed Wisconsin and upper Michigan sales and service representative for J. E. Rhoads & Sons, Philadelphia.

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E. C. Smith Jr., civil engineer, has been appointed special assistant to **F. H. Dryden,** assistant administrator in charge of construction, supply and real estate services, Veterans Administration, Washington. He will have much to do with planning the construction of nearly a billion dollars worth of VA hospitals for disabled and ill veterans.

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Harry Carnick has been named credit manager, Copco Steel & Engineering Co., Detroit.

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William Watson Niven Jr. and **George L. Tuer Jr.** have joined the technical staff of Midwest Research Institute, Kansas City, Mo. Mr. Niven, formerly chief chemist and engineer for U. S. Army Engineering Corps. at Kansas City, Mo., will be assigned to the institute's inorganic chemistry section. Mr. Tuer has joined the physics section. He was with the Aluminum Research Laboratories, New Kensington, Pa., Aluminum Co. of America, Pittsburgh.

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Bruce W. Schafer has been appointed manager, sales and service department, Detroit Electric Furnace Division, Kuhlman Electric Co., Bay City, Mich. For the last 3 years, he was traveling sales engineer for the division. Prior to that, he had served for 4 years in the magnesium research department, Dow Chemical Co., Midland, Mich. Assisting Mr. Schafer in sales engineering in the field is **Charles V. Kilburn,** new head of the research and engineering department of Detroit Electric Furnace Division. He had been design engineer with the division since 1939.

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Algot J. E. Larson, president, Art Metal Construction Co., Jamestown, N. Y., has been appointed community chairman of the Committee for Economic Development for that city.

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Wesley N. Gordon has been appointed manager of the Alloy Sales Division in the general sales department, United States Steel Supply Co., Chicago, subsidiary of United States Steel Corp. Mr. Gordon, recently released from the Army, will have jurisdiction over company alloy sales in Boston, Newark, N. J., Baltimore, Pittsburgh, Cleveland, St. Paul, Milwaukee, St. Louis, and Chicago. He will maintain headquarters in Chicago.

—o—

Kenneth Austin has joined the public relations staff of United States Steel Corp., New York. He had been a financial writer for the *New York Times* since 1927. Mr. Austin, who joined the staff of the *Times* in Paris in 1925, has handled news of the steel industry for his newspaper for many years.

—o—

Frederick A. Purdy has been appointed manager of the new Los Angeles plant, Joseph T. Ryerson & Son Inc., Chicago. Warehouse operations at this new plant are scheduled to begin in October. Mr. Purdy joined Ryerson in 1931, serving first as an engineer at the Buffalo plant, and later representing the firm in New York state. He headed the Rochester, N. Y., district sales office for 4 years. **Theodore L. Kishbaugh** has been named assistant plant manager (STEEL, Sept. 23, p. 98). **Thomas E. Williams** has been placed in charge of Operating and Service Divisions for the plant. He has been with the company 23 years, having first seen service at the Chicago plant, and later at the Buffalo plant. **Vernon D. Rogers,** recently released from the Army, has been appointed office and credit manager. He originally joined Ryerson in 1936. **George W. Gilliland,** who has been in charge of the company's Los Angeles office, will continue in a sales capacity. Other members of the field sales staff are: **John Fennie, Harold Christian, Richard DeLand, Merle Anderson, Milford Tiner,** and **Ernest Lindgren.**

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George A. Doolin, who has been production manager, Racine, Wis., plant, Massey-Harris Co., Racine, since 1932, has been appointed director of purchases for the Racine and Batavia, N. Y., plants of the company. **R. L. Jersted** succeeds Mr. Doolin as production manager.

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Lawrence C. Johnson has been named Milwaukee branch manager, Minneapolis-Honeywell Regulator Co., Minneapolis, succeeding **Harold Pride,** who has resigned to join Boyd Engineering Co., Milwaukee, a Honeywell distributor.

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Daniel P. Murphy, formerly general manager, Gould Coupler Works, Depew, N. Y., has been appointed vice president in charge of operations for Symington-Gould Corp.'s two plants at Rochester and Depew, N. Y.

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C. M. Taylor has been elected executive vice president, Lincoln Electric Co., Cleveland. Mr. Taylor has been with the company since 1916. Granted a leave of absence in 1917, he enlisted in the Air Corps until the end of World War 1, at which time he returned as a foreman. He advanced to assistant superintendent, then superintendent, and in 1928, was appointed vice president in charge of sales. Mr. Taylor has served on the board of directors since 1927. He is a member of the American Welding Society, the Cleveland Chamber of Commerce and the Union Club.

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Ben W. Bittner has joined the Industrial Division, Bryant Heater Co., Cleveland, as a sales engineer. A member of the American Society for Metals, Mr. Bittner has previously been associated with General Alloys Co., Boston, and North American Mfg. Co., Cleveland, in a sales engineering capacity, and with Crucible Steel Co. of America, New York, as a combustion engineer.

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George Kemper, who has been active in setting up distributor sales for A. O. Smith Corp., Milwaukee, has been transferred to the company's district office in

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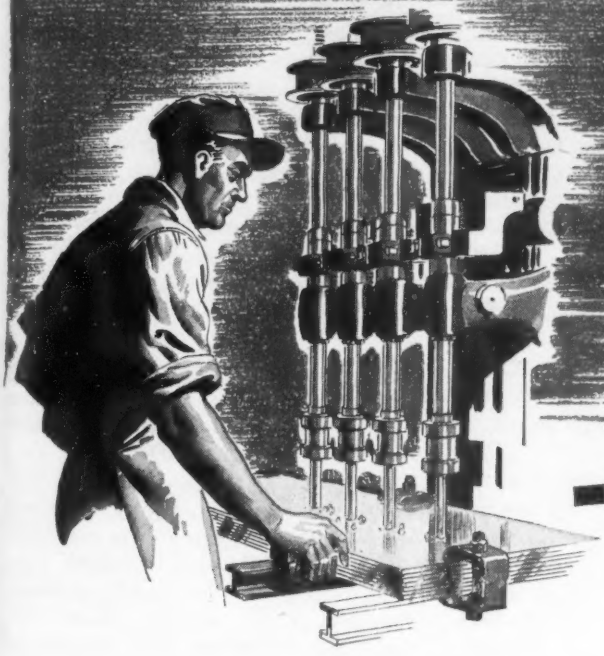

Stack Drilling? What drill feed should be used in drilling ⅜-in. holes through clamped stacks of 20-gage, E-S 18-8 Mo stainless (Type 316) sheets?

Bevel Milling? In beveling E-S 18-8 low-carbon stainless (Type 304) plate edges before welding, must we decrease the speed or feed of the milling cutter as the cut widens?

Hole Size for Tapping? What diameter reamer should be used on holes in titanium-bearing E-S 18-8 plate (Type 321) to be tapped for ¼"-32 threads?

Saw Tooth Set? Is any special set required in the teeth of a band saw for cutting light-gage E-S 18-8 stainless sheet (Type 302)?

Punch-Marking? Can we punch-mark drill holes in E-S 18-8 chrome-nickel plate (Type 304)? What is the best way to start holes at an angle with this plate?

Counterboring? Is reaming likely to harden E-S 17-7 Stainless (Type 301) so much that counterboring is difficult? What is the remedy?

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Atlanta, where he will assist **Walter K. Graham,** administrator for the seven states of the company's southeastern district. Mr. Kemper came to the Smith company three years ago from Glidden Paint Co., St. Louis.

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L. D. Harkrider, president and general manager, General Malleable Corp., Waukesha, Wis., has been appointed Wisconsin state vice chairman of the Committee for Economic Development, New York. Mr. Harkrider is a director of Hein-Werner Motor Parts Corp. and Waukesha Motor Co., both of Waukesha, Wis. He is also a director and vice president of the Wisconsin Manufacturers' Association.

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Herman W. Steinkraus, president, Bridgeport, Brass Co., Bridgeport, Conn., has been named chairman of the Y. M. C. A.'s National Committee on Industrial Program Services. Mr. Steinkraus is president of the Westport, Conn., board of finance and is also president, United War & Community Funds of Connecticut.

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Wayne G. Norton, Eastman Kodak Co., Rochester, N. Y., has been awarded the Adolph Lomb medal by the Optical Society of America. The award is made annually "to a person under 30 years of age who shall have made a noteworthy contribution to optics." Mr. Norton, following graduation from the University of Rochester in 1941, has been employed by Eastman engaging in production engineering, research, design and development of fire control instruments.

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Henry F. Smyth Jr., Ph. D., senior fellow of Mellon Institute, Pittsburgh, has been named chairman of the newly formed committee on chemistry and toxicology, Industrial Hygiene Foundation, Pittsburgh. Other members of the committee are: **Francis R. Holden,** Ph. D., head industrial hygienist, Industrial Hygiene Foundation, committee secretary; **E. C. Barnes,** industrial hygiene engineer, Westinghouse Electric Corp., East Pittsburgh, Pa.; **W. R. Bradley,** industrial hygienist, American Cyanamid Co., New York; **Warren A. Cook,** director, industrial hygiene and engineering research, Zurich Insurance Co., Chicago; **D. D. Irish,** Ph. D., Dow Chemical Co., Midland, Mich.; **F. A. Patty,** head, industrial hygiene department, General Motors Corp., Detroit; **D. A. Russell,** chief chemist, Youngstown Sheet & Tube Co., Youngstown; **H. H. Schrenk,** Ph. D., chief, Health Division, U. S. Bureau of Mines, Pittsburgh; and **W. P. Yant,** Sc. D., director of research and development, Mine Safety Appliances Co., Pittsburgh.

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Max Sidell, president, Seattle Iron & Metals Corp., Seattle, has been elected president of the Pacific Northwest Chapter, Institute of Scrap Iron & Steel Inc., Washington. Other officers of the chapter are: First vice president, **Moe Michaelson,** Riverside Junk Co., Everett, Wash.; second vice president, **Leo Bloch,** M. Bloch & Co., Seattle; secretary, **David Sidell,** Seattle Iron & Metals Corp.; and treasurer, **Harry Sidell,** Seattle Iron & Metals Corp.

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Homer W. Derby has been appointed works accountant of General Electric Co.'s new laminated plastics plant at Coshocton, O. Mr. Derby has been serving in a similar capacity at the Lynn, Mass., plastics works, which is being transferred to the new plant. Mr. Derby joined the company in 1929 following graduation from the Bentley School of Accounting and Finance, Boston, and held various accounting assignments at Schenectady, N. Y. He joined the plastics divisions in 1933 and was made works accountant of the Lynn plant in 1940.

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Dr. Robert W. Sandelin, formerly chief metallurgist, Atlantic Steel Co., Atlanta, Ga., has assumed his new duties as assistant professor of metallurgy, University of Illinois, Urbana, Ill. Dr. Sandelin is a graduate of the University of Minnesota, Minneapolis.

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Raoul E. DuQuette has been appointed to the newly created position of director of purchases of the Rudolph Wurlitzer Co.'s North Tonawanda, N. Y., plant.

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Eugene W. Smith, for more than three years works manager, Lindahl Foundry Division, American Gear & Mfg. Co., Chicago, has become associated with Western Materials Co., Chicago. He will represent the company in the metropolitan Chicago and northern Indiana area. From 1929 to 1943 Mr. Smith was president and general manager, Eugene W. Smith Inc., Evansville, Ind., and for six years prior to that was sales manager, Hougland & Hardy Inc., Evansville.

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Harvey A. Raasch, assistant to the foreign sales manager, Le Roi Co., Milwaukee, has left on a 2-month trip to Mexico and Central America. In countries in the latter area, he will establish a distributorship system to supplement that existing in Mexico.

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William C. Dunn and **N. O. Scourfield** have been elected to the board of directors, Harris-Seybold Co., Cleveland. Mr. Dunn is president and director of Ohio Crankshaft Co., Cleveland, and vice president and director of Park Drop

NORBERT C. RUBIN

Who has been named vice president in charge of sales, Yoder Co., Cleveland, noted in STEEL, Sept. 30, issue, p. 56.

WILLIAM J. KERR

Who has been named vice president in charge of production, Yoder Co., Cleveland, noted in STEEL, Sept. 30 issue, p. 56.

GEORGE EICHELSBACH

Director of manufacturing and engineering, American Stove Co., Cleveland, noted in STEEL, Sept. 30 issue, p. 61.

C. EDWARD PRICE

Who has been elected president, Peninsular Grinding Wheel Co., Detroit, noted in STEEL, Sept. 30 issue, p. 61.

E. U. LASSEN

Chairman of the committee on industrial control devices, American Institute of Electrical Engineers, STEEL, Sept. 30 issue, p. 58.

C. E. FRUDDEN

With Allis-Chalmers Mfg. Co., Milwaukee, elected 1947 national president of Society of Automotive Engineers, STEEL, Sept. 23, p. 103.

Forge Co. of that city. He is also a director of Ohio Seamless Tube Co., Shelby, O. Mr. Scourfield has been with the Dayton, O., plant of Harris-Seybold since 1936, and was named manager 2 years ago.

—o—

D. F. Sawtelle, metallurgist, Malleable Iron Fittings Co., Branford, Conn., has been named chairman of the 1946-47 sand shop operation course committee, American Foundrymen's Association, Chicago. **R. H. Jacoby,** plant metallurgist, Key Co., East St. Louis, Ill., has been chosen co-chairman of the committee.

—o—

Francis J. Curtis, vice president, Monsanto Chemical Co., St. Louis, has been elected chairman of the Industrial & Engineering Chemistry Division, American Chemical Society, for 1946-47.

—o—

J. C. Lungerhausen has been appointed chief development engineer, Industrial Pump Division, Ft. Wayne, Ind., Bowser Inc. For the last 5 years he had been development engineer for Blackmer Pump Co., Grand Rapids, Mich.

—o—

William S. Knudsen has been elected chairman of the board, Hupp Motor Car Corp., Detroit. He became a member of the company's board last June. Mr. Knudsen will be actively associated with the business at the central office of the firm at Detroit.

—o—

W. J. Woods has been named purchasing agent, Rolling Mill Division, Salem, O., E. W. Bliss Co.

—o—

Edward R. Stettinius Jr. and **Robert T. Stevens** have been elected directors of General Electric Co., Schenectady, N. Y. Mr. Stettinius, former secretary of state, retired as chairman of the board of United States Steel Corp., New York, in May, 1940. Mr. Stevens is chairman of the board of J. P. Stevens & Co., New York.

—o—

J. Bryan Williams Jr. has been appointed a member of the executive sales staff, Stamford, Conn., Division, Yale & Towne Mfg. Co., New York. Mr. Williams joined the company last January, following his release from the Army, and spent the ensuing months visiting the various divisions of the organization.

—o—

William B. Cushing, works accounting supervisor, American Steel & Wire Co., Cleveland, has retired after 46 years of service with this United States Steel Corp. subsidiary. In 1925, he became chief clerk of the zinc works in Donora, Pa. In 1943, he was named chief accountant, and in Oct., 1944, was transferred to the company's headquarters in Cleveland as works accounting supervisor.

—o—

John J. Kenny has been appointed manager of sales promotion, International Business Machines Corp., New York. He had been IBM field operations executive, and prior to that, manager of the postwar planning department. Mr. Kenny joined the company in 1917, and has held various sales and executive positions in New York, Cincinnati, Boston, and Newark, N. J.

—o—

Marshall Ward has been appointed New York district manager, Phoenix Iron Co., Phoenixville, Pa. He succeeds **J. L. Vaupel,** who has returned to Boston as New England district manager, a position that he has retained all along.

—o—

W. E. Lewis, vice president, Pittsburgh Lectromelt Furnace Corp., Pittsburgh, has been placed in charge of the company's newly opened Chicago branch office. Mr. Lewis has been with the company for the last 25 years.

—o—

Milton Lewis, vice president, has resigned from Fluor Corp. Ltd., Los Angeles.

OBITUARIES . . .

F. J. Littel, 74, president and general manager, F. J. Littel Machine Co., Chicago, died recently in that city.

—o—

Roy C. Arter, 56, chief engineer, North Electric Mfg. Co., Galion, O., died recently in that city. He was the inventor of a mechanism to detonate the atomic bomb.

—o—

James E. Jopling, 84, surveyor, explorer and mining engineer, died recently at his home in Marquette, Mich. He was among those who pioneered the discovery and development of iron deposits in the upper peninsula of Michigan. He was chief mining engineer for Cleveland Cliffs Iron Co., Cleveland, from 1894 to 1927. Mr. Jopling had been a member of American Institute of Mining & Metallurgical Engineers since 1884. He was president of Lake Superior Mining Institute in 1925.

—o—

Edward F. Hutchens, 77, president, Utility Mfg. Co., Cudahy, Wis., died recently in Indianapolis.

—o—

John E. Robinson, 67, who retired in 1945 as supervisor of metallurgy, International Harvester Co., Chicago, died Sept. 26 in that city. He had been with the company 20 years.

Removing

Most efficient and economical method of removing harmful gases from molten metals, known as "flushing", consists of bubbling a dry inert gas through the metal just before casting. Dissolved gas passes from solution by diffusion into rising bubbles and is carried out of metal mechanically. Process is discussed in two installments of which this is the first

MOLTEN metal poured into castings should solidify with a deep pipe rise, overflow the mold and result in sound castings. But frequently the metal when poured refuses to obey and gives castings of a cheesy, porous structure.

Terms are used in each of several metal industries to describe this phenomenon. Steel men call them wild heats or bleeding ingots. Copper refiners refer to unhealthy, rainy or overpoled copper. Aluminum founders describe the results obtained in the castings as pin hole porosity.

Until recently the general run of plant operators and metallurgists were inclined to blame this type of trouble on the shift before theirs, Mike Spototsky's fondness for fire water, some mysterious element in the furnace charge, gremlins, or the weather. As a matter of fact weather actually has a real bearing on the case, and it makes an excellent alibi as no one can possibly be held responsible or do anything about it.

Dissolved gas, however, is the real cause of all these troubles and, until recently, there were little data available on gas-metal reactions. As far back as 1862 Percy[1] discussed the phenomenon of overpoled copper and attributed it to the evolution of sulphur dioxide. Early in this century Sieverts and his co-workers started work on gas-metal solubilities. During the twenties other research men attempting to improve on Sieverts' methods published a whole series of papers, the results of which were so conflicting that progress on the subject was set back 10 to 15 years. More recent work by Allen, Prytherch, Hanson, Zapffe and Chipman have confirmed much of Sieverts' work. Although the entire broad subject has hardly been scratched, there are sufficient data available to enable us to use at least some degree of intelligence in developing practical methods to combat the effects of dissolved gases.

Fig. 3 is a diagrammatic representation of Sievert's apparatus for determining the solubility of gases in metals at various pressures and temperatures. A sample of the metal is placed in the reaction tube. A vacuum is pulled on the entire system and gas introduced until the desired pressure is attained. The metal then is heated and, after allowing equilibrium to be reached at each temperature gradient, the change in gas pressure is a measure of the amount absorbed by the metal. Various refinements to prevent leakage, to obtain more accurate temperatures in the system, and to eliminate other extraneous factors have been introduced from time to time. One of the best is Allen's apparatus, Fig. 5. In this case, Allen was investigating the reaction $2\,Cu + H_2O = 2H_2 + Cu_2O$. Fig. 2 shows the reaction tube in more detail.

The result of this work has given us a series of solubility curves[2], the first of which are shown in Fig. 1. These represent the solubility of hydrogen in aluminum, silver, platinum and molybdenum at varying temperatures but at constant pressure. The aluminum curve is particularly interesting. Notice that for all practical purposes hydrogen is completely insoluble in the solid metal, but the solubility increases enormously as the temperature is increased above the melting point. Obviously if molten aluminum contains dissolved hydrogen, free gas will be rejected at the freezing point causing porosity in the solid metal. Silver, molybdenum and platinum on the other hand can retain

(1) All references are presented at the end of this installment.

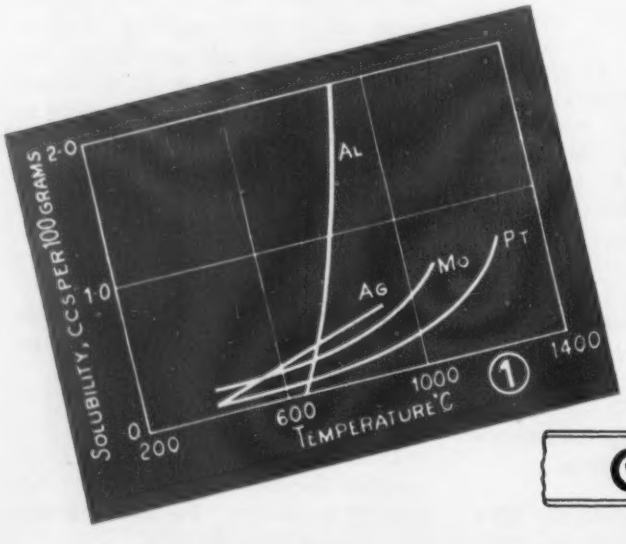
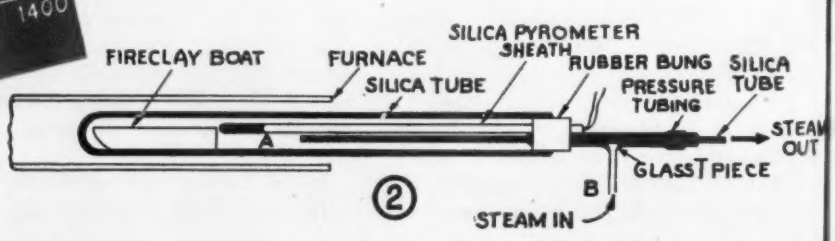


Fig. 1—Solubility of hydrogen in aluminum, silver, platinum and molybdenum

Fig. 2—Details of reaction chamber of Allen's apparatus

Fig. 3—Sieverts' apparatus used for investigating solubility of gases in metals

Fig. 4—Absorption of isobars for hydrogen in various meta's



By P. M. HUME
Metallurgical Engineer
Air Reduction Sales Co.
New York

dissolved gases
FROM MOLTEN METALS

hydrogen dissolved in the solid phase and, while the solubility decreases as the metal cools, there is no sharp break in the solubility curves that would cause sudden evolution of the gas. Consequently, when these metals are cast the gas diffuses out of the solid metal without causing undue stress.

Fig. 8 shows the hydrogen solubility curves for nickel, iron and chromium[3]. Here the gas is appreciably soluble in the solid state but there is a sharp discontinuity at the melting point and, with iron, a sharp break at the phase change from austenite to ferrite. If any of these metals in the molten state contain hydrogen in concentrations above their capacity to retain the gas in the solid metal after freezing, a strong evolution of gas will occur on freezing causing porosity, bleeding heats or whatever else you care to call it. The discontinuity at the phase change from austenite gives rise to another sudden evolution of gas. When the rate of cooling is rapid, diffusion cannot dissipate this relased gas fast enough. The result is internal stress that may be sufficient actually to rupture the metal. This point will be discussed further under flaking.

With the same apparatus Sieverts and his followers have been able to determine the variation in solubility with pressure. Henry's law states that the quantity of gas dissolved in a given quantity of solvent or solution is directly proportional to its partial pressure over the solution. This law does not hold for gases and metals. Most gas metal systems follow what has grown to be known as Sieverts' Law which states that the solubility of a gas in a metal varies directly as the square root of its partial pressure over the metal. Fig. 6 shows the hydrogen absorption isotherms for nickel, iron cobalt and silver[2]. Notice that these are practically straight lines when the solubility is plotted against the square root of the pressure.

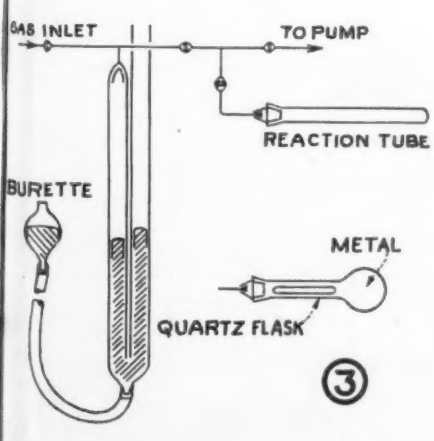
Results of Sievert's work also established the fact that the solution of gas in molten metals differs from normal solution in that the gas dissociates from the diatomic to the monatomic state when it goes into solution.

Variation of gas solubility with temperature is also different from normal liquids. In metals, the solubility increases as the temperature increases. Since solubility of gas in a metal requires dissociation, which in itself is endothermic, the dissociation of gas occurs more readily as temperature increases. The hydrogen absorption isobars are shown in Fig. 4.

The methods which have been illustrated were used to determine gas metal relations under equilibrium conditions, and because of the great care needed to obtain accurate results, this work was done under laboratory conditions. While much useful data were obtained, there is still a great need for methods and apparatus whereby the gas content of metals can be rapidly determined in the shop.

The first attempt by Ellis[1] to determine the gases evolved from commercially melted copper as it solidified is illustrated in Fig. 7. Copper was poured from a ladle into a sand mold, and the silica tube lowered into the metal. The bulb was previously evacuated, and the stop cock "A" was opened when the silica tube was immersed. After a short time "A" was closed and "B" was opened, allowing the gas from the copper to be trapped in the bulb from whence it could be measured and analyzed. There were several sources of error in the method, but qualitative results at least were obtained.

Hare, Pederson and Soler[4] developed the equipment shown in Fig. 9 to measure the gas content of molten steel.



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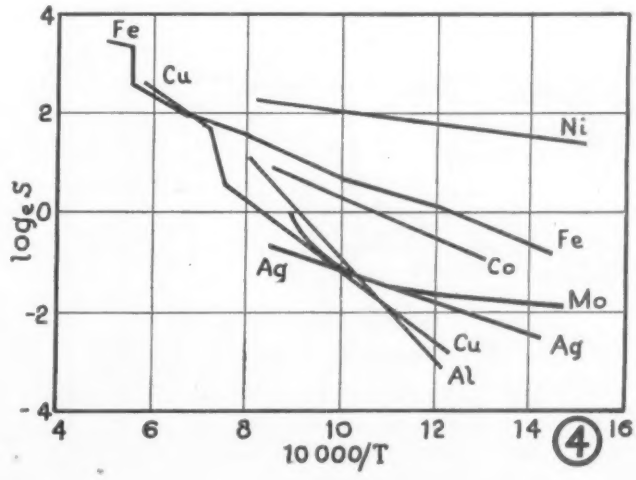

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This equipment is rugged, simple to construct and manipulate. Briefly, the whole system is evacuated, and the bottom end, which is plugged with a copper disk, is plunged beneath the metal. The copper disk melts allowing the molten metal to be drawn up into the tube and the gases evolved are collected. By weighing the equipment before and after the sample is taken, and by measuring all volumes and pressures, a quantitative measurement of gas in the molten steel per unit weight of metal is claimed. There is some doubt that all the gas from all the metal weighed is actually trapped by this method. However, the apparatus represents the best attempt to date.

Importance of measurement of gas content of metals under shop conditions is further emphasized by the fact that gas-metal relations depend upon pressure and temperature. Thus, while we have isobars and isotherms for many gas metal systems, the fact remains that in determining the curves one variable was held constant and readings taken for equilibrium conditions. In actual practice equilibrium is never obtained, and the variation in pressures is not known.

The method in general use for determining the gas content of metals is vacuum fusion. This consists of determining the gas evolved from a solid metal sample melted in vacuum. However, the gas, liberated because of the change in solubility on freezing and because of the solubility change at transformation points, diffuses when the sample is solidified and cooled. Consequently, when a solid sample is used to determine the gas in the original molten metal much of the gas is lost upon cooling the sample and the results of the vacuum fusion method may lead to completely erroneous conclusions[5].

To summarize: Laboratory investigations give us a fairly complete picture of gas-metal relations and have established the general laws for predicting the behavior of gases in metals. Unfortunately, as yet there is no reliable or rapid method for directly determining gas in molten metals. Therefore, in order to determine the effect of dissolved gas as well as any methods used for its control, it is still necessary to examine the castings themselves for the presence or absence of defects.

From the solubility curves it is easy to see that the sudden decrease in gas solubility when the metal goes from the liquid state to the solid state causes an evolution of gas which is liable to be trapped in the freezing metal.

The susceptibility of alloys to gas porosity seems to be related directly to solid and liquid gas solubilities in the constituent metals. Referring again to the curves of solubility of hydrogen in iron, nickel and chromium at varying temperatures and constant pressures (Fig. 8) it will be seen that the solubility of hydrogen in solid chromium is lower than that in solid iron, while the solubility of hydrogen in solid nickel is the highest of the three. We would expect, therefore, that an alloy containing appreciable amounts of nickel in iron would not be as prone to gas porosity in the resulting castings as an alloy compounded of chromium and iron.

Moreover, as Zapffe and Sims[3] point out, the ability of solid metals to dissolve hydrogen depends upon the crystal structure. Face-centered cubic metals, such as nickel and gamma iron, will hold more hydrogen in the solid state than body centered cubic metals, such as alpha and delta iron and alpha chromium. This fact is clearly shown on the iron-hydrogen curve, where there is a definite break at the transformation point.

After hydrogen-contaminated steel is cooled into the gamma range, a further drastic cooling into the alpha phase will result in rapid hydrogen evolution. The release of this hydrogen, coupled with the stresses due to volume change at the transformation point, may result in flakes, fissures or internal cracks. There is still a considerable amount of speculation as to the exact part that hydrogen plays in causing flaking, but it is known that steel which is free from hydrogen is not susceptible to such defects. Even the proponents of the theory that flakes are due mainly to stresses seem willing to concede that dissolved hydrogen has some effect on their occurrence.

There are numerous instances of defects in nonferrous castings which can be attributed to dissolved gas, even though obvious porosity is not present. Cracking in the fillet of chilled-cast copper wire-bars has definitely been traced to sudden evolution of dissolved gas on rapid cooling.

The most difficult metal in which to prevent hydrogen porosity is one in which there is a high solubility in the liquid state, no solubility in the solid state, and a sharp freezing point. Aluminum metal is of this type, and it must be handled specially in order to get a casting which is free from pinhole porosity.

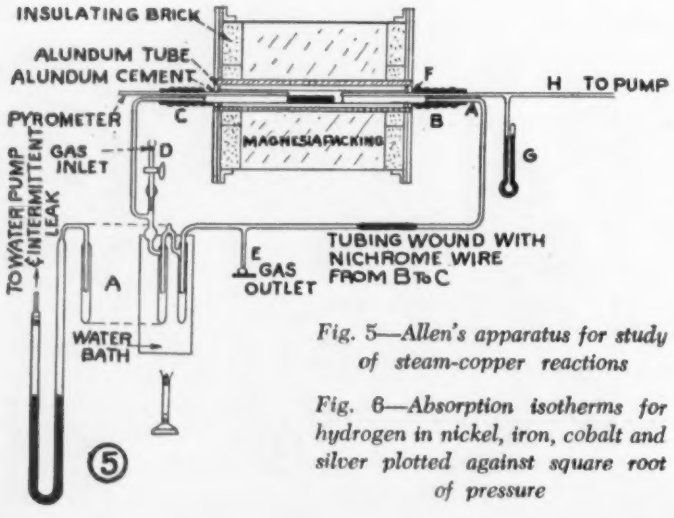


Fig. 5—Allen's apparatus for study of steam-copper reactions

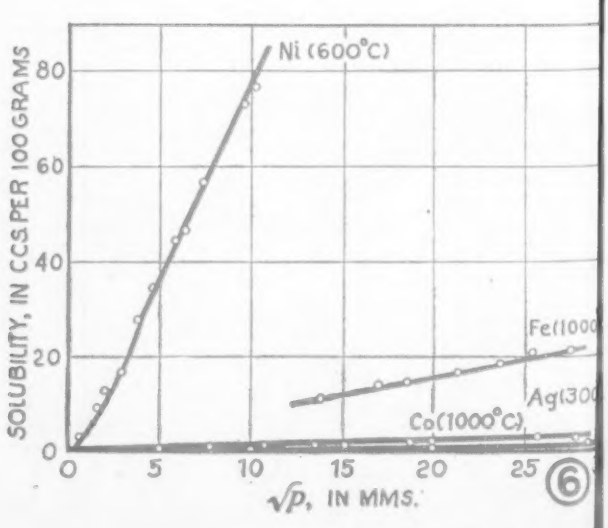


Fig. 6—Absorption isotherms for hydrogen in nickel, iron, cobalt and silver plotted against square root of pressure

After having examined the general laws of gas-metal solution and having discussed in general the defects caused by dissolved gases, it would be of interest to review the sources of gases which affect metal castings. Throughout this paper the term gas and hydrogen have been used almost interchangeably. Hydrogen appears to be the most troublesome. Other gases may also cause difficulty but since we know but little about them this vagueness must of necessity continue.

The primary source of hydrogen is moisture. In the presence of metals and at the temperatures encountered in melting and refining the reaction, $2H_2 + O_2 \rightleftarrows 2H_2O$, is reversible.

Foundry men have long realized the necessity of dry storage for materials and in general take all possible precaution to have completely dry material for charges and flux.

In reverbatory or open-hearth furnaces the metal is constantly exposed to the flame and products of combustion of the fuel which contain either hydrogen or water vapor, or both. Also of primary importance is the moisture in the air. This is carried into the furnace along with the combustion air and at times this presents a troublesome source of moisture.

It should be emphasized again that moisture content in the gases will effect hydrogen pick-up probably in proportion to the square root of the partial pressure of the water vapor. As moisture content of the air increases in hot humid weather, the result is added moisture in contact with the metal. For this reason most melters take extra precautions in the summer to try to avoid all moisture contamination which is under their control, in an attempt to minimize the effect of the extra moisture in the air.

The later stages of handling metal after melting and refining also present opportunities for the molten metal to come in contact with water vapor or hydrogen. Launders and ladles must be thoroughly dried because of the gas which green refractories evolve. In certain instances gas or oil flames are used to preheat ladles and funnels. If this is carelessly done, soot may deposit on the ladles which in turn may absorb hydrogen or hydrocarbons from the gas or oil itself. When the molten metal is poured into or over such a portion, hydrogen pickup with its subsequent porosity will result.

There is always the possibility of moisture being absorbed from the molds or mold dressings. Both improperly dried molds and moisture in mold dressings may cause gas porosity. This phase will be further considered in discussing the flushing process itself.

So far, we have examined the problem of porosity purely from the standpoint of dissolved gases. There are other gases which cause porosity, namely, those which are formed by chemical reactions which take place as the metal solidifies. The classic examples of this type are rimmed steel and tough pitch copper. In making castings of these metals, the refiners deliberately adjust the content of the bath so that the following reactions will take place while the metal is solidifying in the mold.

$$Fe_3C + FeO = 4Fe + CO$$

$$Cu_2S + 2Cu_2O = 6Cu + SO_2$$

The CO and SO_2 are utilized (*Please turn to Page* 160)

Fig. 7—Ellis' apparatus for collecting gases evolved from freezing commercial copper

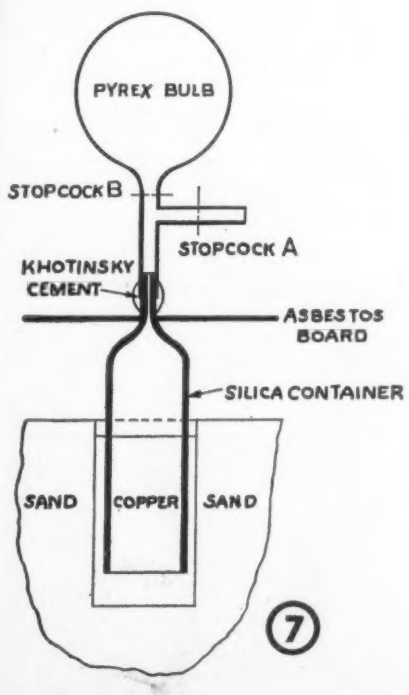


Fig. 8 — Solubility of hydrogen in iron, nickel and chromium

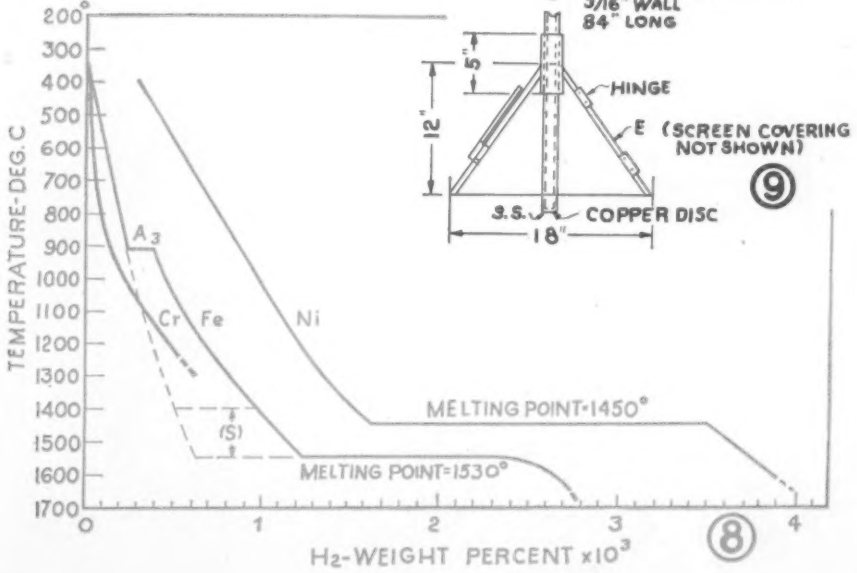
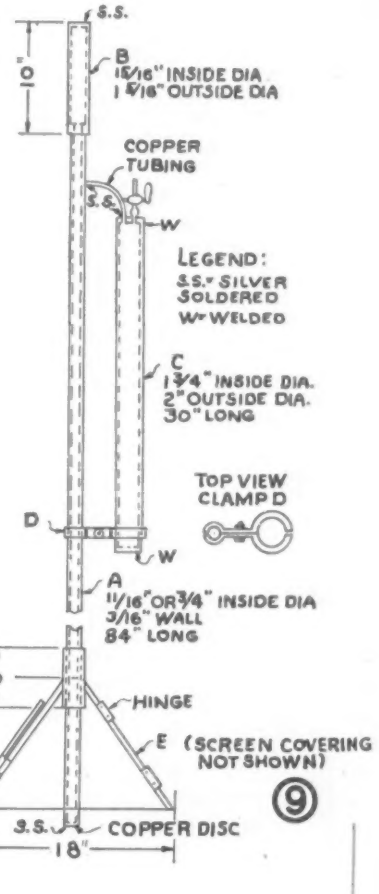


Fig. 9—Hare, Pederson, Soler apparatus for collecting gases dissolved in molten steel



By HERBERT CHASE

Brass Die Casting

. . . offers strength, hardness, wear and corrosion resistance. Increased use of this material is anticipated when high temperature working steels become available for dies

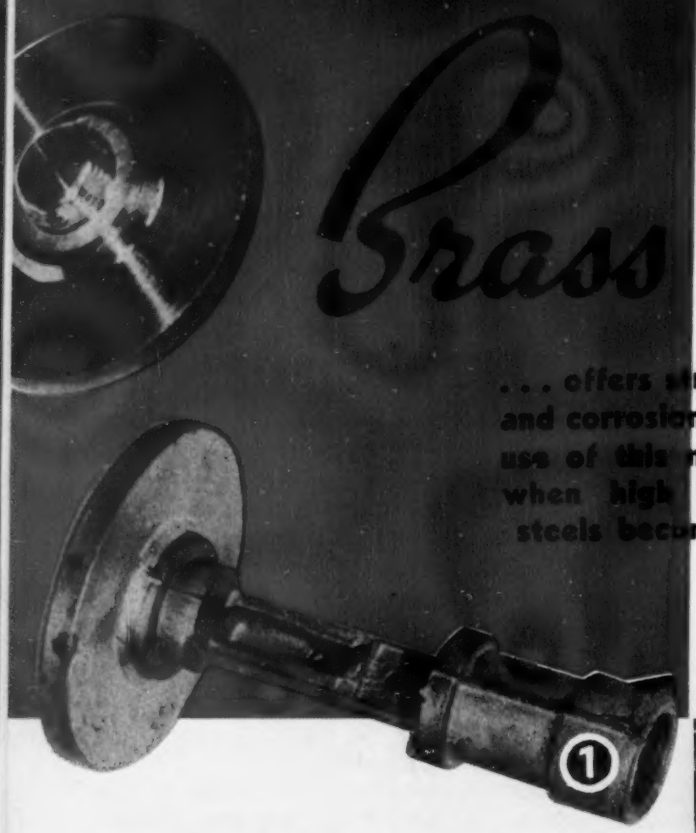


Fig. 1—Above, the assembly produced in the die shown in Figs. 3 and 4 and, below, the forged insert having a boss in which both longitudinal and circumferential grooves have been machined. Around this boss, the die casting is made, joining the parts permanently. Flash left on the shank is cut away in later machining process

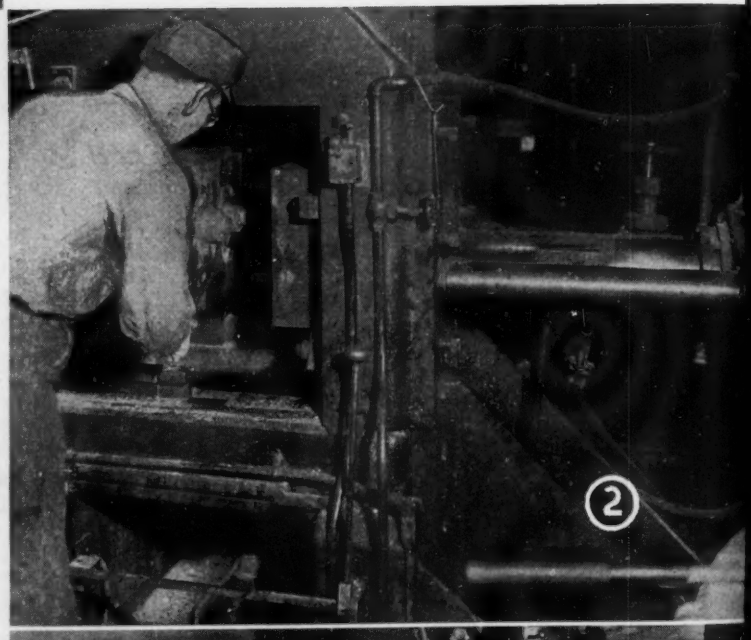


Fig. 2—Closeup of the Lester machine, showing a die open and a gate of castings ready for removal

Fig. 3—Metal being ladled into injector cylinder of the Hydropress machine

Fig. 4—Closeup of the "900 size" Polak machine with die open and a gate of two brass shower head die castings ready for ejection into the chute below

Fig. 5—These two Ajax electric furnaces melt most of the alloy used in the Titan brass die casting department. A ladle (on a light truck for delivering the alloy to casting machine) is being filled

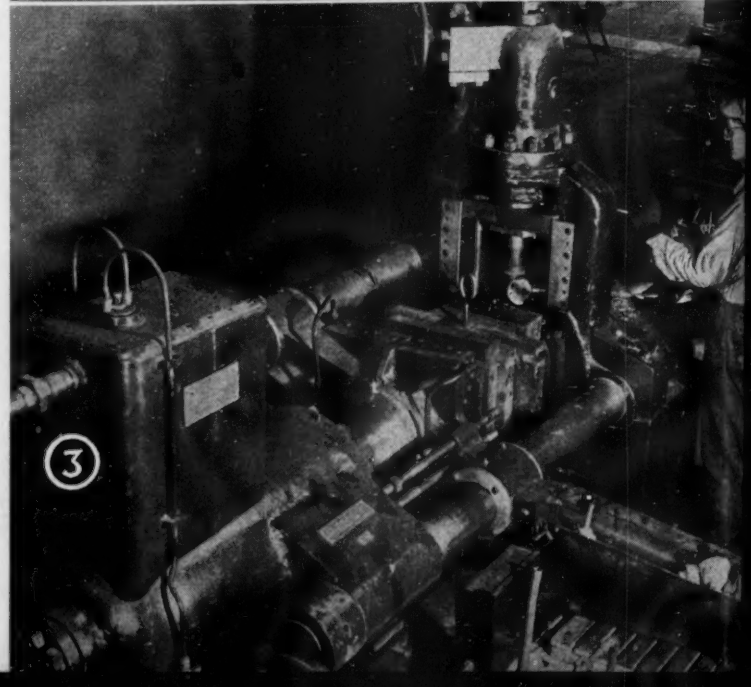


Fig. 6—One of the larger Polak machines shown with die a open and casting b ready for ejection. Injection ram c is operated by a piston in the hydraulic cylinder d. At e is the cold chamber from which a plunger not shown has ejected the slug f which the operator will return to the furnace g. Core pulling attachment, using an air-operated toggle to move the core is shown at h, i being the air cylinder. This is the die for making a piston having a forged head j, used as an insert around whose boss a part of the shank is die cast

Fig. 7—Die for casting the shank of the piston shown in background. In center is a slide that fits adjacent die recesses. Far end of slide carries cores that form side holes in the shank. Plunger in foreground holds flange in the die. A core, not shown, is centered in the recesses at the top edges of the die block and forms the hole in the upper end of the casting. It is this core that is operated by the pulling mechanism shown in Fig. 6

MANY years of experience in producing copper base extrusions, forgings, screw machine products and die castings, have given Titan Metal Manufacturing Co., Bellefonte, Pa., knowledge regarding the advantages and limitations of each product and of the processes by which each is made. Each product has its field of utility and the output of all has grown in recent years. In some respects, die casting of the copper base alloy is the most difficult of the processes, but it yields products that, in general, are not producible by other means or can be made to better advantage and lower cost when die cast.

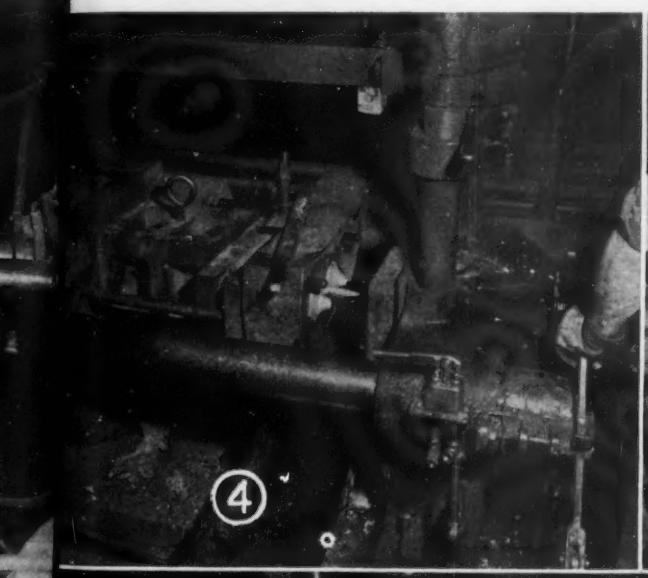
At present, this company operates 10 machines for brass die casting and could make use of a larger number if current demands for new dies could keep pace with demand. About 70 dies are kept in active use, many others are put into service as required, and a large number is being added as rapidly as the company's own die shop and others serving it can build new dies to requisite specifications.

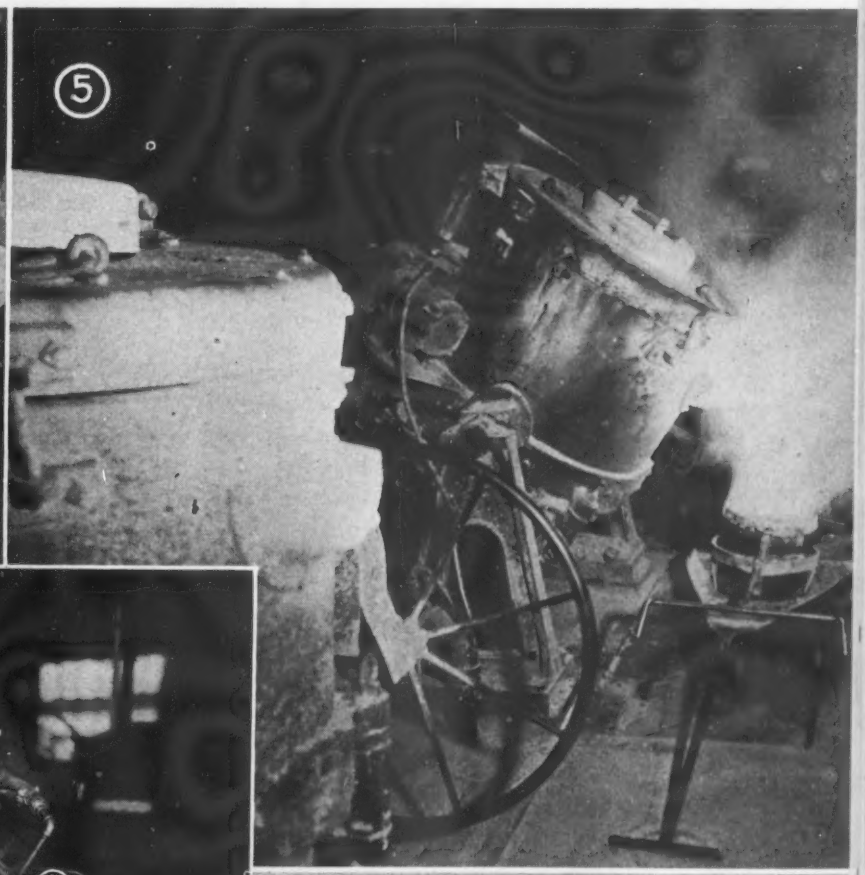
Brass die casting has not developed as rapidly as the die casting of metals of lower melting point. This is partly because there are not yet available die materials capable of withstanding the high operating temperatures required with brass alloys. In other words, die maintenance costs are rather high, especially where demands are for castings that must be held to close dimensions and have surfaces free of check marks.

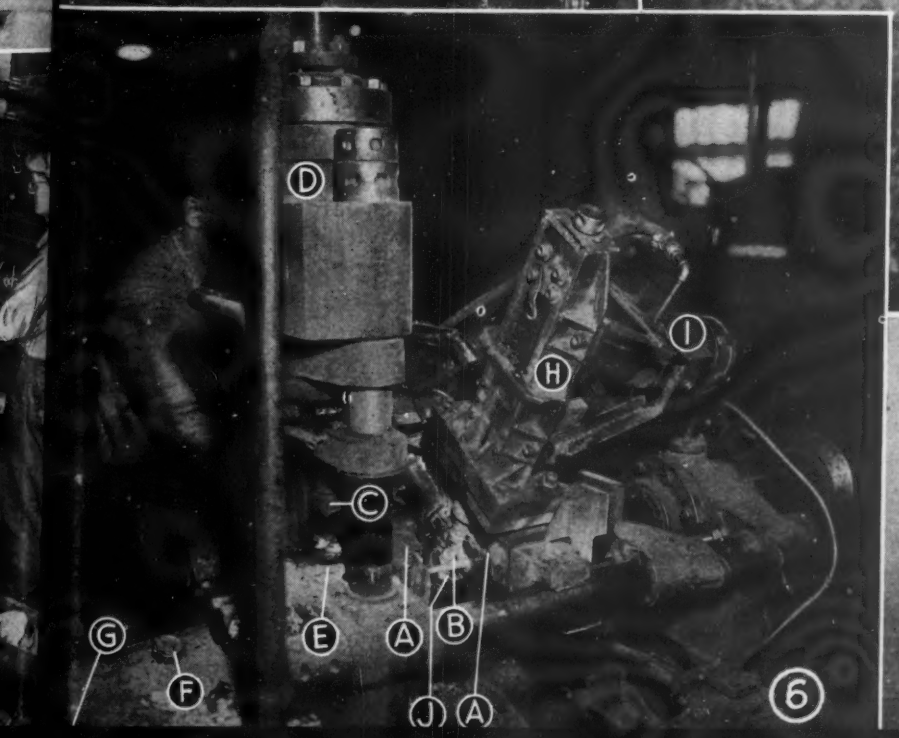
On the other hand brass die castings meet demands for strength, hardness, wear resistance and corrosion resistance that are not met by other die casting alloys and it is where these demands must be fulfilled that brass die castings find their application.

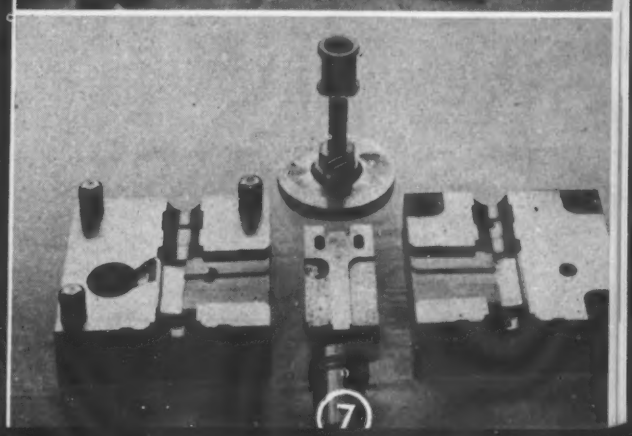
Eight of the die casting machines in this plant are of the Polak type. Originally, several of these machines were operated from a common hydraulic system but they have been modified so that each is now a self-contained unit having its own pumps and accumulator for developing the high injection and die locking pressures required.

All the Polak machines were obtained from Czecho-









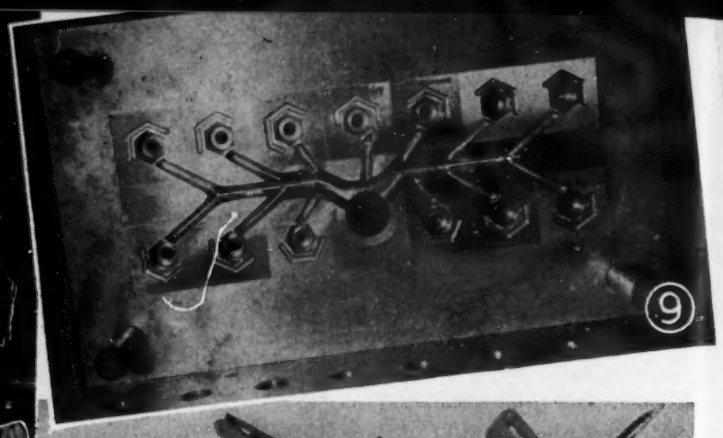


Fig. 8—The Lester-Phoenix die casting machine is the only machine at Titan that uses molten metal

Fig. 9—Half of one of a multiple-cavity die used in the Lester machine. This die makes 13 hex-shaped fittings at each filling. Hole in center is for the end of the injection ram. Runners radiating from the hole enter each cavity through thin gates. When the die is filled, a slug remains in the hole and is ejected along with the whole gate of castings

Fig. 10—Five brass die castings including instrument, typewriter and fluid handling parts from which flash has been removed

Fig. 11—Typical brass die castings as they appear before flash is removed. All except the three parts at the right are in yellow brass. Of these three, the two at top are in Tombasil and the spoon casting is in nickel-silver called Tinicosil

slovakia and have vertical injection cylinders designed for handling semimolten or plastic rather than liquid metal. This has the advantage of employing metal at a somewhat lower temperature than for liquid metal but does not permit using certain dies that can be filled only when liquid metal is injected.

A large Lester-Phoenix machine has been recently added. It uses liquid metal and has powerful toggles that exert high die locking pressures. In consequence, larger dies, including some having long runners, are accommodated.

Latest die casting machine installed at Titan is a size 3 Hydrocast unit built by Hydropress Inc. This machine has a vertical arranged injection chamber, full-hydraulic and self-contained. It exerts a total clamping pressure of 315 tons and a total injection (*Please turn to Page* 164)

COMPOSITION AND PROPERTIES OF BRASS DIE CASTING ALLOYS

	Yellow Brass	Redaloy	Tombasil	Nickel Silver Tinicosil No. 20	Silicon Brass (Eclipsaloy 10)	Nickel Silver Tinicosil No. 21	Naval Brass
Composition (per cent)							
Copper	62	58	80–82	46	63–66	46.0	60
Silicon	....	....	3.5–4.5	....	0.75–1.25	....	....
Lead	1	....	....	1.5	0.50 max.	1.0	....
Tin	0.5	0.5	....	....	....	....	0.75
Nickel	....	....	....	16	....	10.0	....
Iron	....	1	....	1.5	....	1.0	....
Manganese	....	....	....	....	....	3.0	....
Aluminum	....	....	....	....	....	....	....
Zinc	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.
Tensile strength psi	58,000		85,000	85,000	70,000		
Yield strength psi	36,000		50,000	65,000	35,000		
Compressive strength psi	....		....	....	....		
Shearing strength psi	....		....	....	....		
Per cent elongation in 2 in.	6.2		8.0	15.0	22		
Per cent of reduction of area	7.6		10–15	10–18			
Rockwell hardness B	45		....	....			
Brinell hardness	120–130		170	160	120		
Melting Point, deg. F.	....		1575	1675	....		
Specific Gravity	8.5		8.3	8.45	8.6		

Seen and Heard in the Machinery Field

By GUY HUBBARD

Machine Tool Editor

OVER THE BORDER: When this page is being printed, I will be renewing old acquaintances and making new ones in Montreal and Quebec, following three days at the fall meeting of the American Society of Mechanical Engineers in Boston.

I always like to go to Canada. I believe that machinery men generally do like to go to Canada. Invariably we get a royal reception over the border and invariably we come away with the conviction that machinery men in Canada know their business and cope ably with some problems which do not exist to any such degree here in the United States.

One thing in particular which always impresses me, is the manner in which they attain mass production efficiency in many cases on products which are identical or very similar to ours, but for which their markets are considerably smaller—and therefore the production lots correspondingly smaller. Production men here in the States can afford far more elaborate and costly tooling than can the Canadian engineers, so the latter have become highly proficient in devising low cost tooling and in performing repetitive operations without resorting to any kind of special tooling.

On many occasions I have heard Canadian engineers state that there should be clearer understanding of this situation on the part of production executives in the States who have some degree of jurisdiction over manufacturing policies of branch plants or affiliated companies in Canada. Before attempting to "export" a ready made tooling plan across the border, it should be weighed carefully in terms of the volume of production across the border. There are no geographical boundaries to ingenuity here in America. Don't overlook the fact that it flourishes north of the border to fully as great an extent as it does south of the border.

TRANSFER OF SKILL: There seems to be growing interest in methods by which machine tools can be made to reproduce intricate shapes through template and other pattern and model control. In part this is due to increasing use of dies (a subject hinted at elsewhere on this page). Also, it is due to increasing use of highly accurate mathematical curves on parts used in such devices as prime movers, process control apparatus, instruments, etc.

Several generations of inventors have dreamed of machines which would translate mechanical drawings into finished parts without taxing the skill and intelligence of the machine operator to any extent. Some of the achievements in contour control come very close to achieving that direct translation from "dream-to-reality".

WASTE NOT, WANT NOT: During the war there was tremendous emphasis on conservation of materials—metals in particular. That condition of things went on so long (in fact, it still continues in connection with numerous commodities) that something new and permanent may have been added to the economics of design, tooling and production methods.

The economic history of America to a large degree has been the story of wasteful methods induced by plenty, which in due time have brought about scarcities which have demanded broad revision of processing methods. Forests were destroyed to obtain potash, charcoal and paper pulp. By the same token, many a steel bar has been reduced to chips to obtain a mere tote box full of finished parts. Nor were the chips themselves salvaged until within recent years. I well recall that during the first World War, untold acres of land were "filled in" with machinery steel chips.

I detect a growing tendency now on the part of designers and production men to ask this question in connection with new products: "In making this part, isn't there some way in which we can get the desired shape by 'pushing the metal around' rather than by whittling a lot of it away in the form of chips?"

As a matter of fact there are many ways in which metal can be moved around to shape—extremely accurately to shape oftentimes—and machine shop practice is becoming colored by such techniques. Remarkable things were done in shell plants on hot and cold forging, forming, piercing and drawing of shells and shell cases. Many of those processes can and are being applied to peacetime products. Instead of the material in the hole going onto the scrap pile, it becomes a part of the product. That certainly makes sense.

Forward-looking machine tool builders are watching this trend—not with jealous fear, but with keen appreciation of the fact that it is a challenge to their ingenuity. They have no desire to be partners in wastefulness, they want to be partners in conservation.

Therefore, they are devising new machines to turn out work from large tubing instead of bars. They are devising machines to finish forgings, stampings, etc., instead of roughing corresponding parts out of the solid. They are building machines which form parts and threads by rolling instead of by cutting tools.

The end result is going to be that America will make its metal resources go much further than otherwise would have been the case. Also, I am convinced that a much closer liaison is going to exist between builders of machines which push metal around and those which remove metal in the form of chips. The two methods will be cooperative rather than competitive—and smart machinery builders are destined to have more business, although it will be somewhat different in character from that of other days.

Machining Stainless S

By E. VON HAMBACH
Research and Development Engineer
Carpenter Steel Co.
Reading, Pa.

Requirements for satisfactory economical results in turning, threading and milling these steels are covered by the author in the second article of this series

TURNING operations on automatic screw machines and turret lathes involve so many variables that it is impossible to make specific recommendations which would apply to all conditions. Tool angles, cutting speeds and feeds given here are primarily starting points for working out each job.

Table VII gives the high and low range for turning and cutting various stainless steels. A good starting point may be taken halfway between the range given—adjusting the speed upward or downward until the best results are obtained. These speeds are recommended for stainless grades in various conditions, such as hot rolled, cold drawn or centerless ground, with hardness ranging from 187 to 250 brinell. Dead soft annealed material is very tough

TABLE VII—TURNING SPEEDS AND FEEDS

Type No.	Surface Feet per Minute (Low and High)	Approximate Feed in Inches	Nearest Comparable Equivalent in Ordinary Steel
410	80/115	0.003/0.008	SAE-3140, 4140, 6140, etc
420	40/80	0.003/0.008	SAE-1095, 3150, 3312, 6150
420F	80/110	0.003/0.008	SAE-2315, 2340, 2345
440	40/60	0.003/0.008	High Speed Tool Steel
440F	70/90	0.003/0.008	SAE-1060, 1070, 1095
443	80/110	0.003/0.008	SAE-3145, 3250, 4650, 6150, etc.
302	40/85	0.003/0.008	Copper-nickel alloys—except that 302 work-hardens
416	110/140	0.003/0.008	SAE-1030, 1120, X1340
430	85/115	0.003/0.008	SAE-3140, 4140, 6140, etc.
430F	120/150	0.003/0.008	SAE-1030, 1120, X1340
329	60/80	0.003/0.008	Copper-nickel alloys
303	85/120	0.003/0.008	SAE-3120, 3145, 4615

NOTE: Figures shown above are average. On some jobs it may be possible to use even higher speeds. However, on certain work the nature of the part may require slower speeds than are recommended here. All recommendations are based on the use of standard high speed tools.

TABLE VIII—TURNING CHECK CHART

Trouble	Correction
Tool heats badly.	Is tool heavy enough? Does it have enough mass to carry off generated heat? Check lubricant as it might be too rich in sulphur base oil and should be cut back with a coolant such as paraffin base oil.
Cutting edge breaks off.	Tool ground with too coarse a grinding wheel. Not enough mechanical support due to grinding large concavity in front clearance. Use straight angular grind with minimum clearance, usually between 7° and 10°. (See Fig. 8).
Chips pile on top of tool.	Top rake angle not steep enough, should be 5° to 10° angle. Also indicates need of "chip curler." If curler is used, it is not deep and wide enough. Stoning top rake to a fine smoothness helps chips slide off.
Work cuts with taper	Rough turn to 0.003/0.005-in. of finished size and shave with tool steel, using light cut at a fast speed. Check lubricant to be sure mixture has enough paraffin oil to serve as coolant for dissipating heat.
Poor or rough finish.	Check cutting tool. If ground on coarse grit wheel and not stoned this is natural result. Cut may be too heavy. Stock may be too soft, and is "picking up."
Cannot hold close tolerance.	Close tolerances are not readily obtainable on heavy cuts. Machine to 0.003/0.005-in. of finished size and tolerance required and then take a shave or finishing cut with fairly fast speed. Have lubricant on thin side for cooling purposes.
Tool "rides" work.	Tool not sharp enough. Top rake angle not steep enough, causing "bugging." Look for "play or looseness" in machine or tool.
Work glazes or hardens.	Tool either dull or riding too far above center of work. The use of a solid type steady-rest will glaze or work-harden job—change to roller type steady-rest.
Tools "hog in."	Rake angles too small. Also check side clearance. Stock may be extra dead soft. Carriage may be loose. Cutting edge of tool below center line. See Fig. 9.
Circular form tools gall and bind on sides.	Cut too deep for side clearance allowed. Increase angle of side clearance. If this goes beyond allowable limits of finished piece, a shaving operation will have to be added.
Cannot take finish cut close enough for threading.	Stock too soft or cut too heavy. Add shaving operation taking a light fast finishing cut (0.005/0.008-in.). Experienced operators are doing this and eliminating grinding before thread cutting for Class 3 fits.
Tools burn.	Lubricant may be too thin. Add more sulphur base oil. Spindle speed too high. Check with Table VII. Material too hard for type of turning tool being used.
Excessive tool wear.	Generally an indication of too rich a mixture of sulphur base oil. Add paraffin oil until excessive wear is reduced.
Tools won't hold edge.	See Stoning, Part III for data on grinding and stoning of cutting edge. Following these recommendations has generally increased tool life from 10 to 60%. Several cases reported higher than this.
Tool cuts undersize after grinding.	Look for a "bug" on cutting edge. Sometimes a small one remains after grinding. This starts building up metal right away, resulting in undersized cut. Stoning after grinding will eliminate this. Mechanical adjustment of machine may be required.
Chatter marks.	Tool is not being held tight in fixture, causing vibration. Tool is not properly set with center line of work. Excessive clearance angles tend to cause chatter. Too heavy a cut or too light a machine. A roller steady-rest will help to prevent chattering.
Tool heats excessively and finish is rough.	Not enough clearance angle. Tool rubbing against work, creating friction heat. This requires more pressure to feed tool and the rubbing causes poor finish.
Double chips.	This occurs when tool has chip groove which is carried through the front of tool or cutter. This can be overcome by proper regrinding.

TABLE IX—THREADING SPEEDS

Type No.	Surface Feet per Minute—Low and High: Acme Threads	Nat'l Fine Threads	Nat'l Coarse or Tapered Pipe	General	Fine Threads
410	12	10/20	18	10/20	5/10
420	12	10/20	18	10/20	5/10
420F	12	10/20/25	18	12/25	5/10
440	12	10/20	18	10/20	5/10
440F	12	10/20/25	18	12/25	5/10
443	12	10/20	18	10/20	5/10
302	12	10/20	18	10/20	5/10
416	12	10/20/25	18	12/25	5/10
430	12	10/20	18	10/20	5/10
430F	12	10/20/25	18	12/25	5/10
329	12	10/20	18	10/20	5/10
303	12	10/20/25	18	12/25	5/10

NOTE: The wide range of the above recommendations is due to the possible use of any one of four types of chasers and the variable conditions of material threaded. Slightly harder material (210-240 brinell) will thread easier than dead soft annealed stainless steels. Each job has to be developed for best production results, keeping in mind speeds should be increased or decreased in small steps. All recommendations are based on the use of standard high speed tools.

Steels

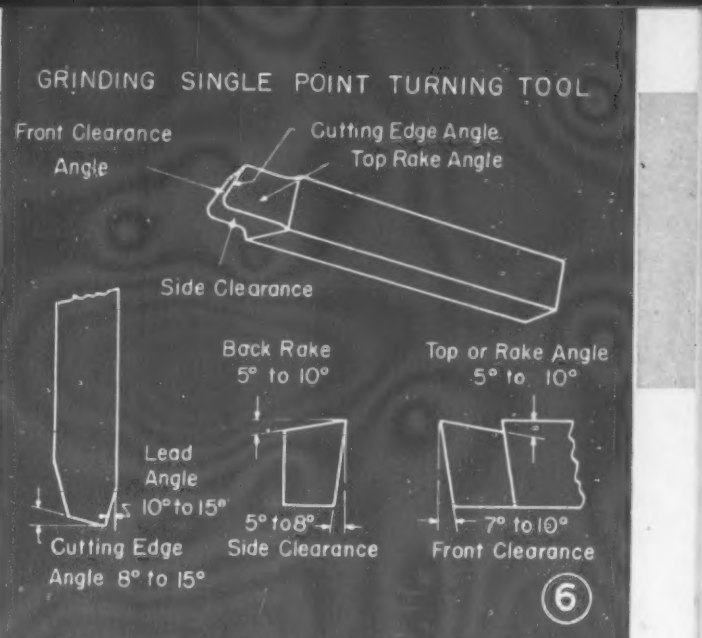
and draggy; all stainless steels will machine somewhat better when they are slightly harder than the dead soft annealed condition. Where higher physical properties are required, stainless can be machined in hardnesses up to rockwell C[1] 34.

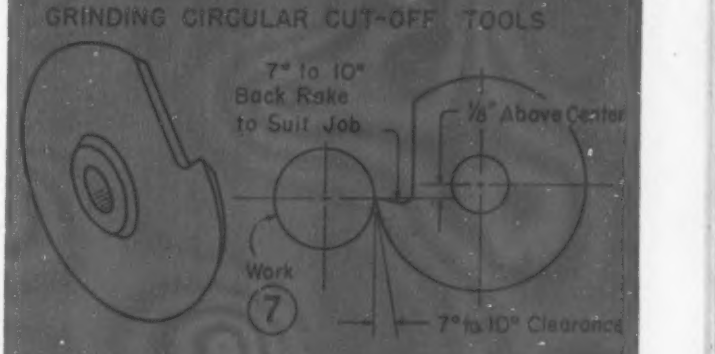
Due to the slightly lower heat conductivity of stainless steels, they will generate more heat than ordinary steels. This heat is held locally in the work and tool. Therefore, these five simple points, carefully checked, often represent the difference between a slow or fast job—and a good or poor finish:

First, select as large a tool as possible, because the life of the cutting edge depends on good heat dissipation in the body of the tool, as well as into the work and cutting oil.

Second, to insure giving cutting edge maximum mechanical support, it is best to hold front clearance angle to the minimum, roughly between 7° and 10°.

Third, top rake should be fairly steep. Tools with a 5° to 10° angle will generate less heat and be freer-


GRINDING SINGLE POINT TURNING TOOL
Front Clearance Angle
Cutting Edge Angle
Top Rake Angle
Side Clearance
Back Rake 5° to 10°
Top or Rake Angle 5° to 10°
Lead Angle 10° to 15°
5° to 8° Side Clearance
7° to 10° Front Clearance
Cutting Edge Angle 8° to 15°
6



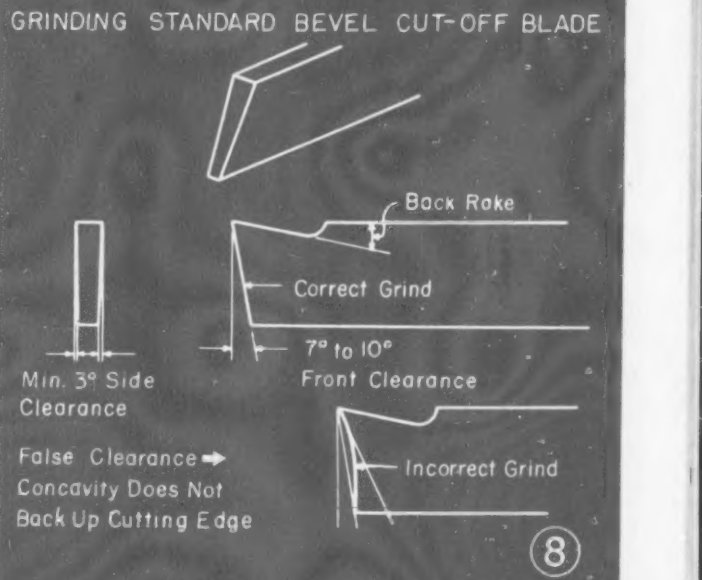


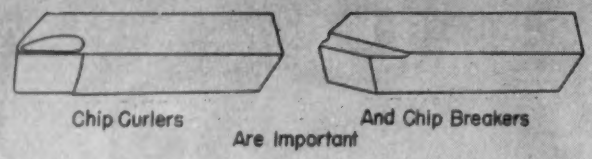
TABLE X THREADING CHECK CHART

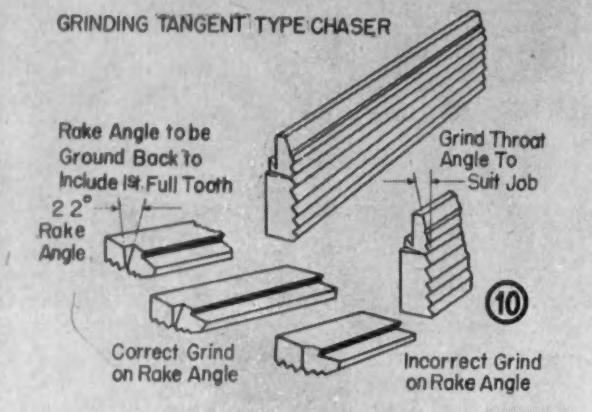
1. Sharp chasers cut better threads. Don't run chaser too long; it costs less to grind them oftener.
2. A die head clogged with chips or having weak springs will result in poor threads and possible breakage of chasers.
3. Trouble is avoided if throat angles in the set are ground exactly alike.
4. When sharpening chasers burning is prevented by taking light cuts with a soft wheel. Grinding too slow with heavy cuts, or a hard wheel, will burn the chaser and cause grinding checks.
5. A bad start of the die head on the work is most likely the reason for getting a thin first thread. If all your threads are to be good, check work and threading spindle for proper alignment and be sure they are O. K. Bad alignment will bring on trouble.
6. Where possible, chamfer or bevel the work so all chasers will start cutting at the same time. Die head and work must line up properly to avoid eccentric threads. A good bevel on the work is important in getting concentric threads.
7. Rough threads often result when cutting at too high a speed; cutting oil is not properly blended; or dirty oil is loaded with fine chips that act as an abrasive. On circular chasers, rough threads can also result from too much face angle; it is best to hold to the recommended angle of 1½°.
8. If there is not enough hook angle on face of the chaser, top of the threads will be rough.

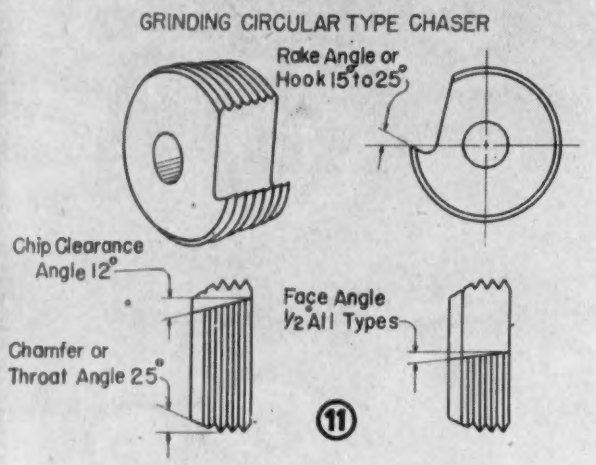
TABLE XI MILLING SPEEDS

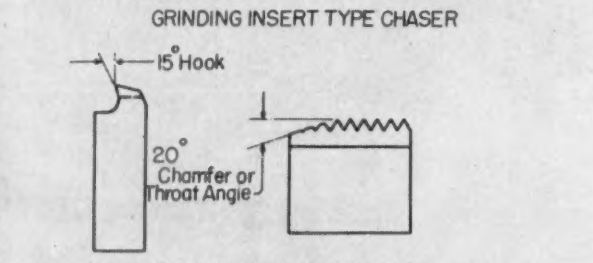
Type No.	Surface Feet Per Minute (Low and High)	Nearest Comparable Equivalent in Ordinary Steels
410	70/105	SAE-3140, 4140, 6140, etc.
420	35/70	SAE-1095, 3150, 3312, 6150
420F	70/100	SAE-2315, 2340, 2345
440	35/80	High Speed Tool Steel
440F	65/80	SAE-1060, 1070, 1095
443	70/100	SAE-3145, 3250, 4650, 6150, etc.
302	35/65	Copper-nickel alloys—except that 302 work-hardens
416	100/125	SAE-1030, 1120, X1340
430	70/105	SAE-3140, 4140, 6140, etc.
430F	110/135	SAE-1030, 1120, X1340
329	55/70	Copper-nickel alloys
303	75/110	SAE-3120, 3145, 4615

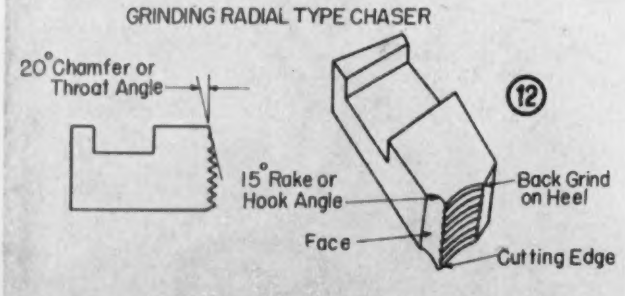
NOTE: Above speeds are average. For some jobs the higher speeds may be used and on other jobs—depending on the type of work—it may be preferable to use speeds on the lower side. All recommendations are based on the use of standard high speed tools.

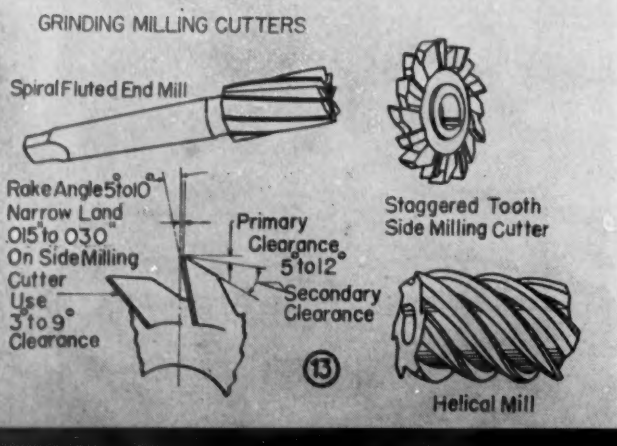



GRINDING TANGENT TYPE CHASER
Rake Angle to be Ground Back to Include 1st Full Tooth
22° Rake Angle
Grind Throat Angle To Suit Job
10
Correct Grind on Rake Angle
Incorrect Grind on Rake Angle


GRINDING CIRCULAR TYPE CHASER
Rake Angle or Hook 15 to 25°
Chip Clearance Angle 12°
Face Angle ½° All Types
Chamfer or Throat Angle 25°
11







cutting. Generous chip curlers or chip breakers are also a decided advantage.

Fourth, use "finishing cuts" for very close tolerance. If the work cuts to a taper, it is recommended that turning be carried to 0.003-0.005-in. of finished size, then finishing with a light cut with the machine set at a fairly fast speed.

Fifth, all stainless steels take a good finish easily and on the light cuts a good coolant that will carry away the heat is more important than a lubricant.

Grinding tools properly is particularly important in machining stainless. Generally, the straight chrome free-machining types such as Type 416, Type 430 F, and Type 420 F machine easiest of all. The regular chrome-nickel (18-8) types however, due to their tough, draggy condition and work-hardening characteristics, require turning tools ground with the top rake angle on the high side (see Fig. 6). Smaller (*Please turn to Page* 150)

TABLE XII—MILLING CHECK CHART

Trouble	Correction
Cutter "hogs in."	Check rake angle. Too much rake will cause "hogging in." Check speed.
Excessive vibration.	Check clearance, especially on cutters with more than one cutting surface. If clearance is not enough, rubbing will cause vibration. Check lubricant. Binding may be result of too heavy an oil, not carrying away heat fast enough.
Cutter wears badly without galling or heating up.	Add paraffin oil to lubricant. Too much sulphur base oil wears away cutting edge, as sulphur is abrasive. See lubrication, Part III.
Cutter "bugs" up and burns.	Check lubricant. Mixture may be too thin. Assuming cutting speed is not too fast, add more sulphur base oil. See lubrication Part III.
Cutter burnishing behind cutting edge.	Check width of land and clearance. This is definite indication the land is too wide.
Plain milling cutter binds in deep slots.	Change to a staggered tooth side mill with alternating spiral teeth.
Cuts not straight.	Check how work is clamped. Work piece can be sprung from over-tightening of clamp or vise.
Work piece slips.	Some pieces, due to shape, are hard to hold. Often, a piece of paper slipped under work will help to prevent slipping.
Chatter on straight tooth cutter.	If cutter is sharp and clearances sufficient, plus good lubrication, this job requires a helical tooth cutter which has a shearing action that cuts more freely. If you are using a helical tooth cutter, look for back lash in machine, a loose arbor or a worn shank on miller. Check solid shank cutters for nicks. A nick leaves a high spot and a cutter works loose.
Shell end mill won't cut accurately after grinding.	This is an indication that cutter was removed from arbor for grinding. Once a shell end mill or face mill is on arbor, don't take it off. You can seldom reset it as it was.
Cutter does not run true.	Generally this is due to "poor housekeeping." Cleanliness is of major importance. Dirt or a fine chip can be caught between the arbor and the spindle or between the cutter and the arbor. This will cause the cutter to run several thousandths out of true. Also a "sprung" arbor or a "burred" spacer will cause same trouble.
Work cuts out-of-square.	Again "good housekeeping." This can be from chips between the work and the fixture or chips and dirt in the "T" slots, causing misalignment when clamping fixture. Brush or blow all chips away before a new work piece is mounted.
Work burnishes.	Cut is too light. Cutter not biting into steel. Increase depth of cut.
Poor or rough finishing cut.	Your last cut was too heavy. Take a lighter cut and increase speed for better finish.
Indication of high pressure on cutters.	Change to a coarser tooth cutter. Too many teeth cutting at same time. A coarser tooth cutter will allow more space between teeth and relieve chip packing.
Too much rake.	This will show up by cutter "hogging in." Use smaller rake angle.
Vibration.	Not enough clearance on top and sides. Cutter is binding. Grind for more clearance.

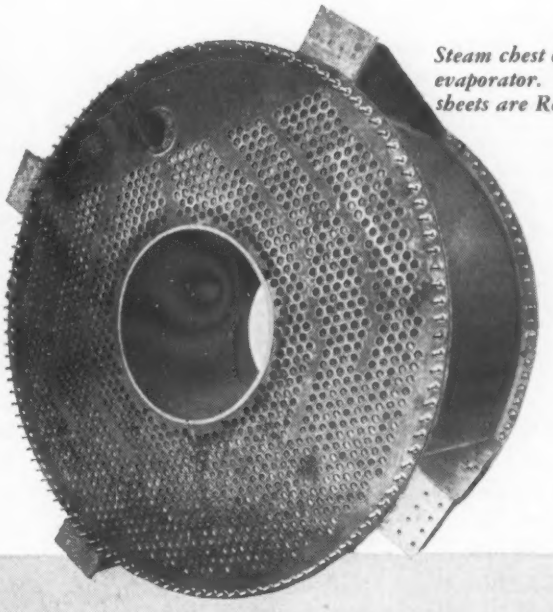
Skilful designers take advantage of REVERE'S many metals

THIS large evaporator equipment affords an excellent example of skilful designing to take advantage of the special characteristics of two of the Revere Metals. For high heat conductivity and corrosion resistance, Revere copper tube and tube sheets were used for the steam chest. For the strength of mild steel and the corrosion resistance of copper, Herculoy plates were used.

There are many different Revere Metals, because no one metal can possibly serve all purposes. The important thing is to select among these metals those most suitable for each given set of conditions. Sometimes this is not easy, requiring a skilful balancing of such factors as corrosion resistance, strength, weight, cost per pound, cost per cubic foot, cost of fabrication, time consumed in fabrication, service expectancy, and even appearance. We will gladly discuss with you the many, varied, and sometimes contrasted virtues of Revere Metals, either in general terms, or in relation to a specific product or piece of equipment.

Revere Mill Products include—*Copper and Copper Alloys:* Sheet and Plate, Roll and Strip, Rod and Bar, Tube and Pipe, Extruded Shapes, Forgings; *Aluminum Alloys:* Tube, Extruded Shapes, Forgings; *Magnesium Alloys:* Sheet and Plate, Rod and Bar, Tube, Extruded Shapes, Forgings; *Steel:* Electric Welded Steel Tube.

Catchall, 90" x 5' 5" face to face, made of Herculoy.



Steam chest of 11' ID x 30' 6" evaporator. Tubes and tube sheets are Revere Copper.

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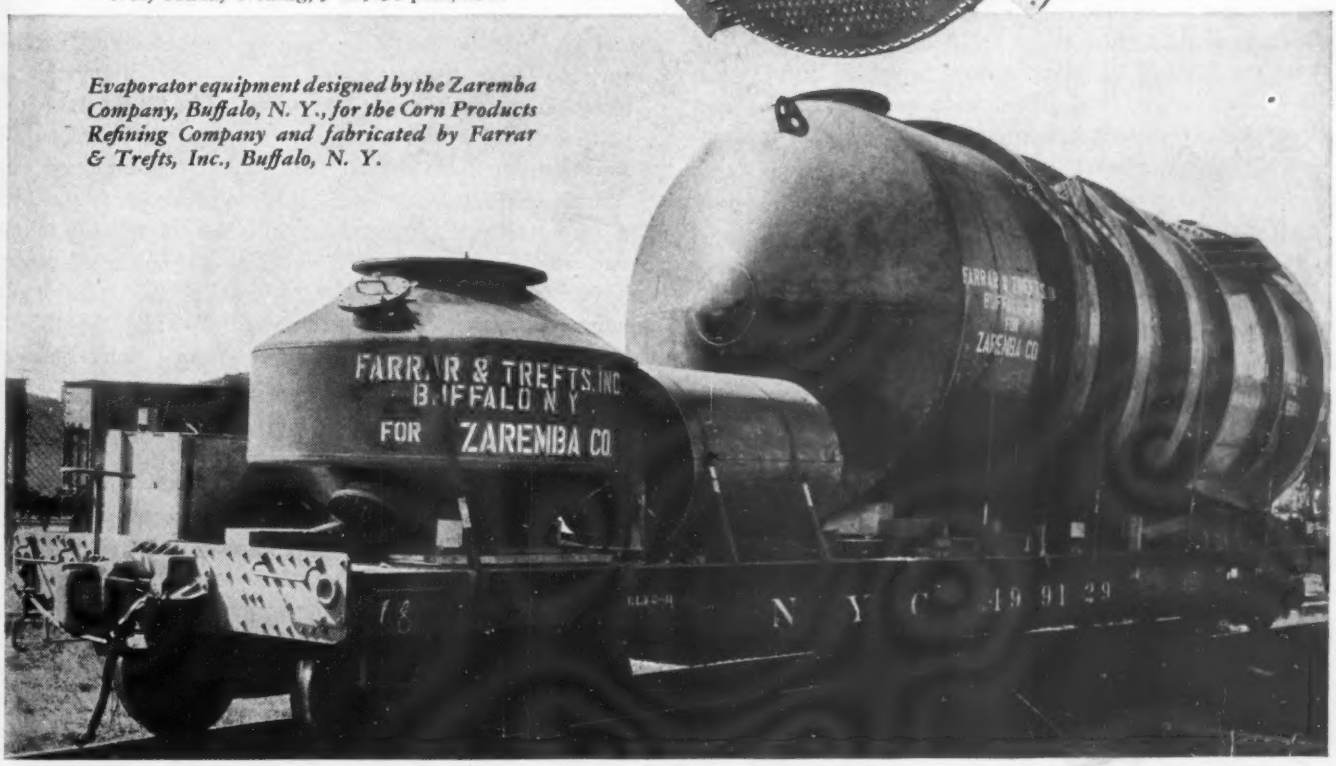
Evaporator equipment designed by the Zaremba Company, Buffalo, N. Y., for the Corn Products Refining Company and fabricated by Farrar & Trefts, Inc., Buffalo, N. Y.



Engineering News *at a Glance*

GRINDING wheels using a new abrasive developed by Norton Co. at Worcester, Mass., have a definitely faster and cooler cutting action, longer life and require fewer dressings, according to the firm. Grains of the abrasive, through a new special electric furnace process, are formed as individual crystals that do not require crushing to size. In the process they assume a chunky, nubbly shape with many plane surfaces forming both exterior and re-entrant dihedral angles—the latter making definite rake angles which increase cutting efficiency of the grains. Electric furnace invented by the company makes the abrasive by fusing high purity aluminous ores so individual crystals are formed in a fluid matrix. Crystals are separated from the matrix by a complicated, continuous chemical process, then screened into standard grain sizes.

EXTENDED facilities now enable Sam Tour & Co. Inc., New York, to provide industry field service in nondestructive testing, it was learned recently. The company now offers the use of trained service engineers to cope with problems encountered in connection with corrosion, erosion, liquid level and dezincification. These men are reported skilled handlers of the Penetron and Probolog instruments—used in nondestructive testing, for example, examining high pressure pipe lines from the outside for dangerous internal corrosion or erosion and to explore ship hulls and tanks for thinning of walls.

SOME 37,000 lb of high-strength nickel-chromium-molybdenum steel castings were furnished recently by Crucible Steel Casting Co. to Wellman Engineering Co., at the order of the general contractor, National Engineering & Construction Co.—all of Cleveland—for the reconstruction of the Center street bridge in the same city. The order consisted of 44 roller castings, weighing 400 lb each 18 in. in diameter and 10 in. wide across the face, and 10 tons of track castings, each 10¾-in. wide, 6 ft 4 in. long and 3⅝-in. thick.

MORE than 1200 obsolete Navy and merchant ships will be scrapped under a plan of the Civilian Production Administration and other government agencies to provide iron and steel scrap for industry. Some of this metal is scheduled to go into plumbing fixtures, cast iron soil pipe, radiators and other home-building materials and equipment.

NOVEL water-cooled rotor turbine, capable of using normal material at normal temperatures, and at the same time utilizing high gas temperatures for the turbine cycle, was developed by German researchers, according to a report in possession of the Department of Commerce, Washington. Rotor is essentially a hollow drum with blades attached radially. Holes drilled in the blades connect with the interior of the drum, but at the blade tip they are blind. Water introduced into the rotor fills the blades and drum to a predetermined depth. A slight density change in the water, caused by centrifugal force, results in circulation of the water. Circulation also is initiated by the high temperatures, which raise the water level to where its specific heat is theoretically infinite. This permits considerable heat transfer for a very limited surface.

BY dipping metal parts in a solution of cellulose acetate butyrate and hot castor oil, a continuous, tough coating is formed that protects such parts from corrosion and abrasion in transit and storage, according to Tennessee Eastman Corp., Kingsport, Tenn. Polished mild steel plates coated 0.1-in. thick with the material held in a closed container over water at 100° F for 150 days with no sign of rust. Dipping operation is simple, and the transparent coating permits complete visual inspection and identification of the part. Not only can the coating be stripped easily off parts, but it can be reused by melting.

WARTIME mechanization in handling materials is now paying off during peacetime production in the foundry of Union Steam Pump Co. at Battle Creek, Mich. Here a 3-wheel towing tractor with dump body carries molding sand from stock pile to mixers, hauls coke and wood for starting fires and does miscellaneous heavy handling jobs. A Clark Trucktractor carloader fork truck with a bucket attachment handles bulky castings, helps to load the tractor and handles shakeout sand, burned molding sand and refuse. During the night, the same truck is used to carry hot castings up to 2000 lb per load in the bucket attachment from molding floors to cleaning room and tumbling mills.

PARTS to be finished can be processed directly after forming and trimming operations, providing die or stretcher marks do not penetrate too deeply into the surface of the work, by means of an improved mechanical finishing method called Britehoning. Developed by Sturgis Products Co., Sturgis, Mich., the process is basically a tumbling method involving the use of mineral chips and suitable compounds for developing a fine semilustrous finish on practically all types of metal parts. It is ideally suited as a preplating operation for finishing small zinc base die casting or brass stampings prior to bright nickel and chromium plating.

OFTEN, in circular products such as crane wheels, it is desirable to have a hard, wear-resistant rim, while a ductile web is required for best impact properties, and a soft hub to facilitate boring operation. For such requirements, Bethlehem Steel Co. reveals in its booklet 216, it developed a specially designed quenching device generally known as a spinner. Sections with sufficiently large hub and rim dimensions are clamped between two disks and spun around their axes at high speed, while water is sprayed against their rims. During this quench-

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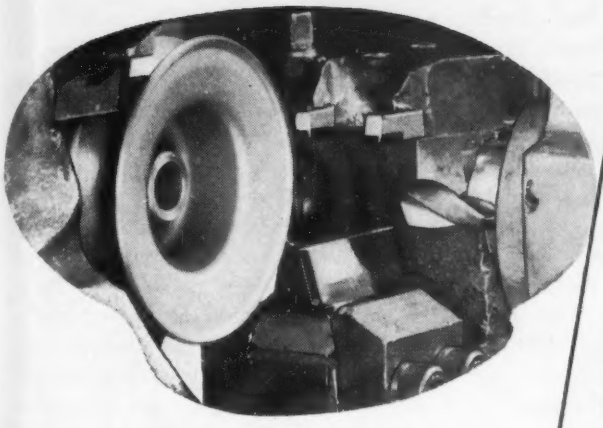
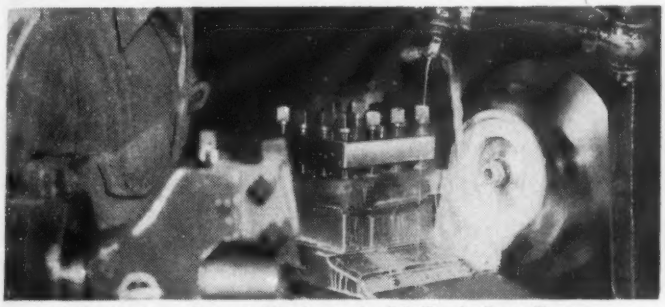
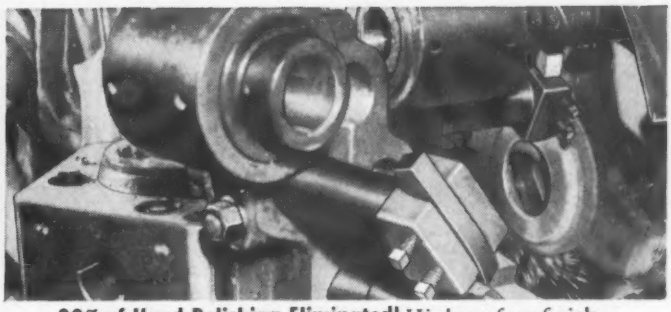


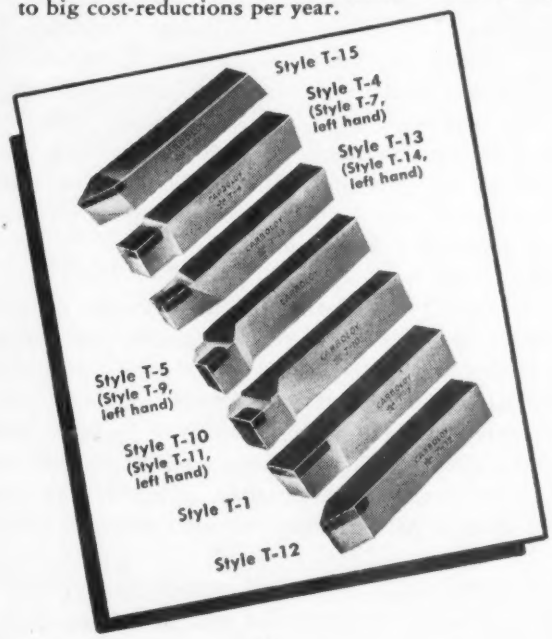
Machines Run 4 Times Longer Per-Tool-Grind! In job-lot machining of cast iron pulleys, "Standards"—adapted to 8 roughing and finishing operations—held down initial tool costs, stepped up production, kept machines running 4 times longer per tool grind.



4 Stations on Turret Eliminated—19 Tools Saved! By tooling up with Carboloy Cemented Carbide "Standards", 4 turret stations were eliminated, 19 tools saved. Savings like this, month after month, add up to big cost-reductions per year.



80% of Hand-Polishing Eliminated! High surface finish obtained in mass-production machining of this steel gear made possible cutting hand-polishing time 80%.


Style T-15
Style T-4 (Style T-7, left hand)
Style T-13 (Style T-14, left hand)
Style T-5 (Style T-9, left hand)
Style T-10 (Style T-11, left hand)
Style T-1
Style T-12

CHANGE TO CARBOLOY "STANDARDS" FOR RESULTS LIKE THESE IN YOUR PLANT

A change to Carboloy Cemented Carbide "Standards" is a change to increased production, better finish, lower cost. Available in 11 Standard Styles—adaptable to 60%-80% of the turning, facing and boring jobs, they are actually priced lower than ordinary tools in many sizes.

For a useful guide to most efficient use of "Standards", grades, prices, specifications, etc., write today for Catalog GT-175R.

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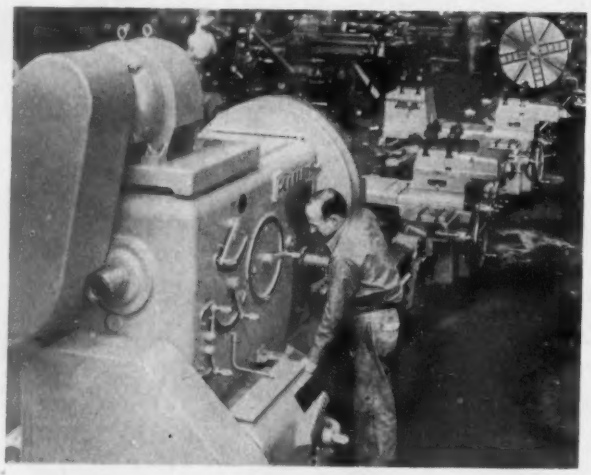
ing, both web and hub are protected from the water's action. All spinner operations are controlled by time clocks, and arranged so water cannot be applied except when the blank rotates at full speed. Thus water is prevented from impinging on a stationary blank, which would cause nonuniform hardness. After treatment, rim attains high hardness and wear resistance, while web and hub are in normalized state.

OXYGEN at one steel plant is being piped like water into the blooming mill, welding shop, open hearth and stockhouse departments according to "Steel Facts." It is produced by separating nitrogen from common air. The air is taken into the plant, compressed, cleaned and separated. During the process a temperature of 300° below zero is produced. Final product is a bone-dry oxygen gas of 99.6 per cent purity which is then ready for storage in the company's three banks of 800 cylinders, having a total capacity of 200,000 cu ft. From here the gas is fed into pipe lines that lead into the various departments.



GIGANTIC lathes, such as the 50 x 33-in. machine shown in the accompanying illustration, are being built for export to France, it was learned recently from R. K. LeBlond Machine Tool Co. in Cincinnati. Equipped with two carriages and a newly developed special face plate on the tailstock, the lathe can cut simultaneously four different diameters on stock up to 3 ft in diameter and 33 ft in length. In spite of its huge proportions, the machine handles effortlessly because carriages and tools are electrically operated. Exact use of the lathes in France is not yet known.

OPERATIONS such as spinning, deep drawing and welding sometime partly destroy the finish of stainless steel, hence repolishing may be necessary. Proper polishing methods vary with the type of job and the equipment on hand. There are, however, several "do nots" which apply to polishing in general, according to "News and Views," published by Chicago Steel Service Co. in Chicago. Some of these are: Do not use wheels or buffs that are contaminated with other metals. Do not use any buffing or greasing compounds which contain iron oxide, and do not use Turkish emery because of possibility of iron contamination which will result in discoloration of the stainless.

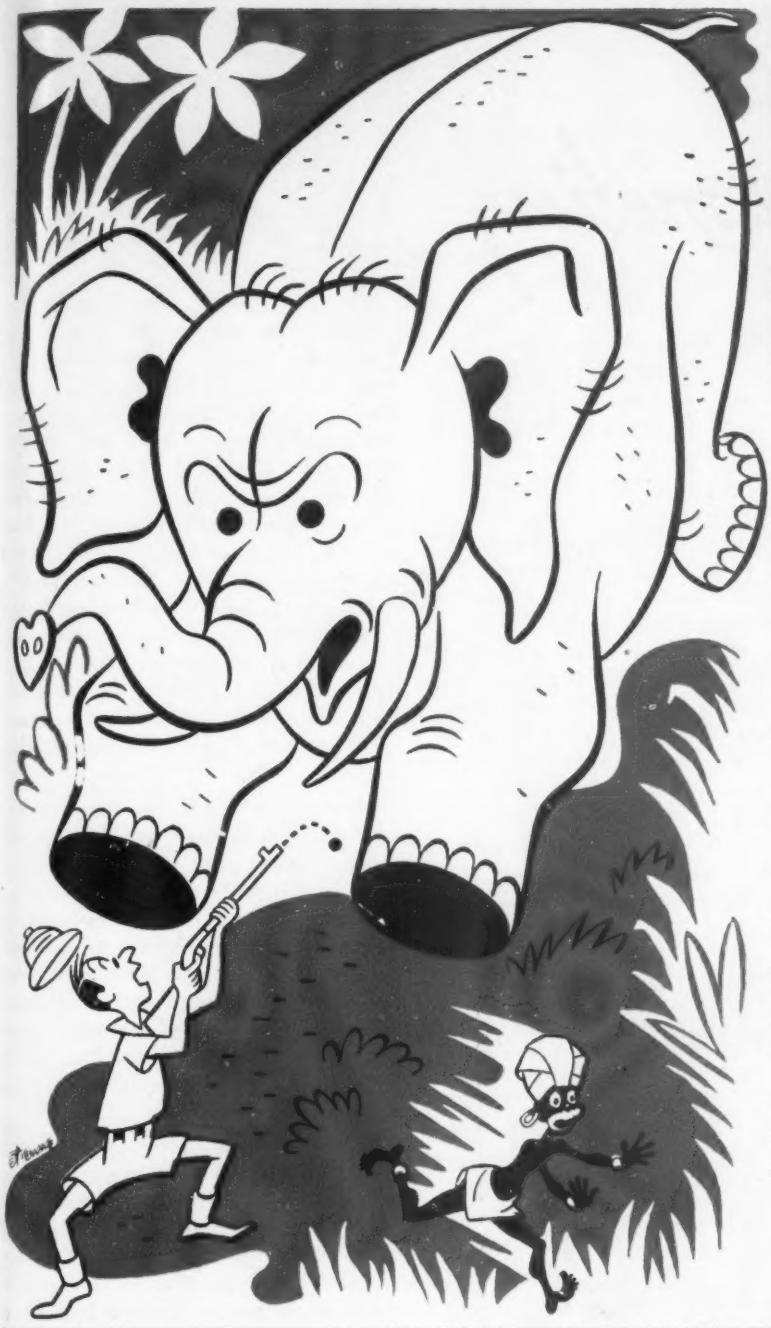
IN a recent demonstration, a jet-propelled plane was launched at 116 miles per hour in about 4 sec after a run of only 340 ft with the aid of an electropult designed by Westinghouse engineers for Navy carrier and land-base use. Unassisted the plane would have required a run of 2000 ft for the takeoff. Device is essentially a huge electric motor laid out flat. Its 1382-ft track corresponds to the rotor of a conventional machine, and the small shuttle car which runs along it acts as the stator. The plane is shot in the air by the car as it speeds down the track. According to Westinghouse, the development has no apparent limitations in speed or capacity within range of requirements now foreseen. It gains in effectiveness as size of the aircraft increases. Designs already are completed for a device capable of launching the largest existing air liners at 120 miles per hour with a takeoff run of 500 ft.

FROM New York, Charles Hardy Inc. reports that a new low-carbon stainless steel powder is now being produced in commercial quantities. It appears to be exceptionally well suited for the manufacture of porous filters, acid and corrosion-resistant parts. According to the concern, a stainless steel flake powder also has been developed for use in the coatings industry. Suitable for spraying applications, it can be mixed with the usual vehicles. Preliminary tests indicate the product has good acid and corrosion resistance.

GEAR tooth pointing production may be jumped to 1800 gear teeth per minute under average conditions by using a machine referred to as the "Sixty" produced by Cross Co. of Detroit. With the machine, small shops, handling short runs on a variety of work, can make changeovers from job to job within 20 min it was learned. Its operation is automatic. Work is clamped by means of a foot pedal control. This frees the operator's hands to feed and unload the machine.

DEVELOPED specifically for high-current capacity, and especially applicable for electroplating and battery charging, but not limited to this use, are the new 5 x 5¾-in. selenium rectifier plates built on aluminum, now manufactured by the Seletron Division of Radio Receptor Co., New York. Featuring maximum heat dissipating value, these stacks when arranged in suitable combinations of series or parallel plates provide continuous service.

IN CLEVELAND, Speco Inc. reveals development of a new type industrial finish that can be applied directly over rusty surface without cleaning or scraping. The black paint is said to seal corroded surfaces, stopping further rusting permanently. According to the company, regardless of submergence in water or exposure in moist or fume laden atmosphere, the paint prevents further oxidation, and provides an ideal base for decorative paints.



you wouldn't hunt elephants with a "BB" gun.....

Nor would you put carbide cutting tools on a lathe that cannot transmit the power to use them at their maximum efficiency. Carbide cutting tools have increased horsepower requirements as much as 300 per cent. They have increased cutting speeds 200 to 500 per cent.

The chances are that turning accounts for 25 per cent or more of all machining time in your plant.

There are cases in our files of savings of hundreds of dollars a month in the manufacture of a single part by the use of Jones & Lamson machines. Our Turret Lathes and Fay Automatic Lathes are designed specifically for the most efficient use of carbide tools.

Be skeptical of the production efficiency of all metal turning equipment in your plant.

Telephone or write for a Jones & Lamson engineer who will be glad to consult with you on all phases of your metal turning problems.

What HORSEPOWER Are You Using?

15 horsepower is required to take this 1/8" depth of cut on steel forging at 1000 RPM and .022" feed, with a carbide cutting tool, but carbide halves the cutting time.

Engineered to "Carry the Load" for Most Productive Operation With Carbide Cutting Tools

Turret Lathes

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Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers • Ground Thread Flat Rolling Dies.

AUTOMATIC *Spray Enameling*

SPRAYING of porcelain enamel on the interior of hot water tanks can be accomplished automatically and uniformly by a machine developed by Ferro Enamel Corp., Cleveland, for which a patent has been applied. The machine, shown in Fig. 2, consists of a spray cylinder which passes down and up inside the tank shell, coating the inside of the tank while in motion.

Liquid porcelain enamel flows from the two nozzles into the spinning spray cup located on the end of the spray cylinder (Fig. 1). The enamel, upon coming in contact with the rapidly revolving spray cup, is broken up into a fine mist and deposited on the tank interior. Quality and thickness of enamel coating is determined by feed nozzle size and enamel feed pressure.

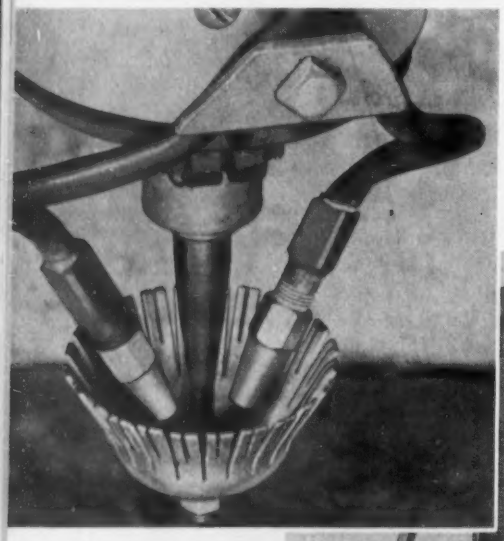
To begin the operation the spray head is at top position and spray shield is raised to allow placing of tank in spray chamber in such a manner that the spray head is centered over it. After closing the spray shield, the down switch on the control board at right is closed, thus starting the motor which turns the drums, unreels a cable and in turn lowers the spray unit. A high-speed air motor, located inside the 4-in. pipe which suspends the spray unit, revolves the spray head cup at high speed.

As the unit descends, a spring-controlled valve engages an adjustable bar tripper, opening the valve and permitting liquid enamel to flow from a controlled pressure storage tank through copper tubing to the feed nozzles which feed it into the spinning spray cup. Centrifugal force of the spinning cup breaks the enamel into a fine mist at spray points determined by slotted construction of the cup.

When the spray unit reaches a point where the cup is below the lower edge of the cylinder after having deposited a continuous, uniform coating, a tripper engages a reversing switch, which causes motor to change direction, reel up the wire cable and raise the spray unit. Spraying is continued until enamel flow valve disengages with first tripper bar, closing valve and stopping flow of enamel to the cup. At this point, or slightly higher, the second tripper engages the adjustable switch, shutting off the motor and stopping all vertical motion. Machine has duplicate outside switches acting as safety limit switches and designed to act in event of failure of either of other switches.

Although still in the experimental stage, Ferro visualizes use of this machine in a continuous plant using conveyors to place articles to be coated in the spray chamber. Motion of the conveyor would have to be intermittent so as to co-ordinate the motion of the spray unit with the conveyor. Forward motion of conveyor would be in effect only while spray unit was in its raised position and would be of sufficient duration to bring piece to be coated under spray unit.

By integrating motion of the two units, the switch that stops the upward motion of the spray unit starts the conveyor. When conveyor motion is halted by means of a timer or a tripper set to stop it after it has traveled a certain distance, the same control can be used to activate the starting switch and start the spray unit and thus repeat the cycle.



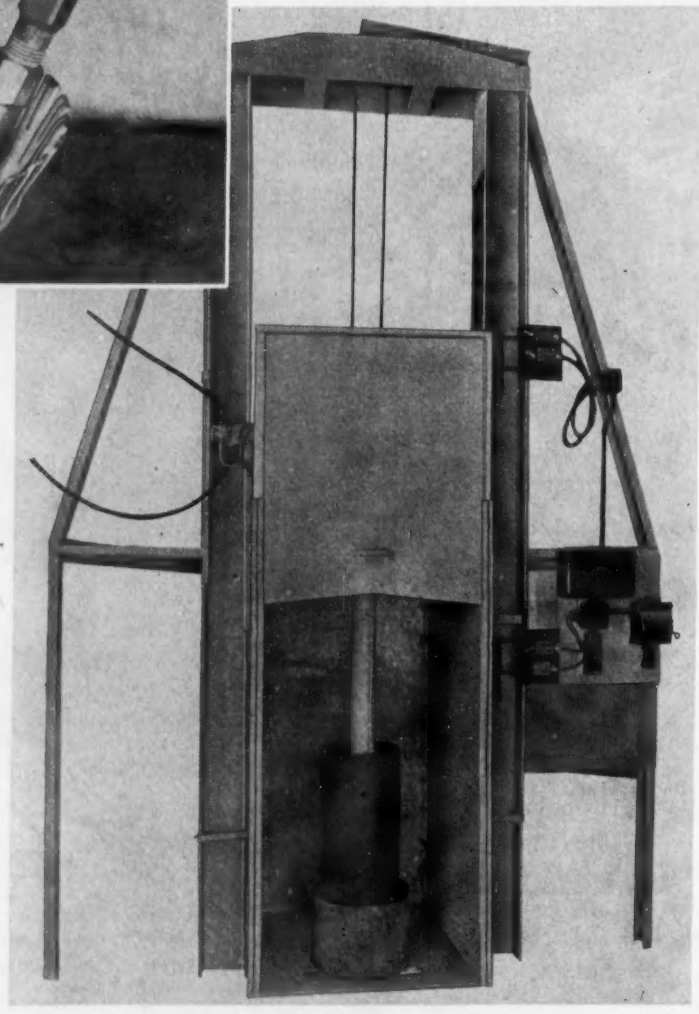


Fig. 1 (left above)—Closeup of spray unit. Porcelain enamel in liquid form is ejected from two nozzles into slotted cup which is rotated at high speed by air motor inside shaft. Centrifugal force deposits enamel in uniform coat on wall of tank

Fig. 2 (left) — Overall view of automatic tank spraying machine. Spray shield is raised to show tank shell in place and spray unit lowers into spraying position. Control panel is at right and control switches are above panel and on left of machine

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By H. J. CHAMBERLAND

GRINDING PRECISION TOOLS

Factors which contribute to microinch accuracy in grinding gage blocks and other precision tools upon which modern mass production depends are re-examined in this resume

Fig. 1—Parts on magnetic chuck represent 20 vernier caliper jaws being surface ground simultaneously. More than 50 grinding operations are required

Fig. 2—Angular surface grinding gage blocks to within a few seconds of arc

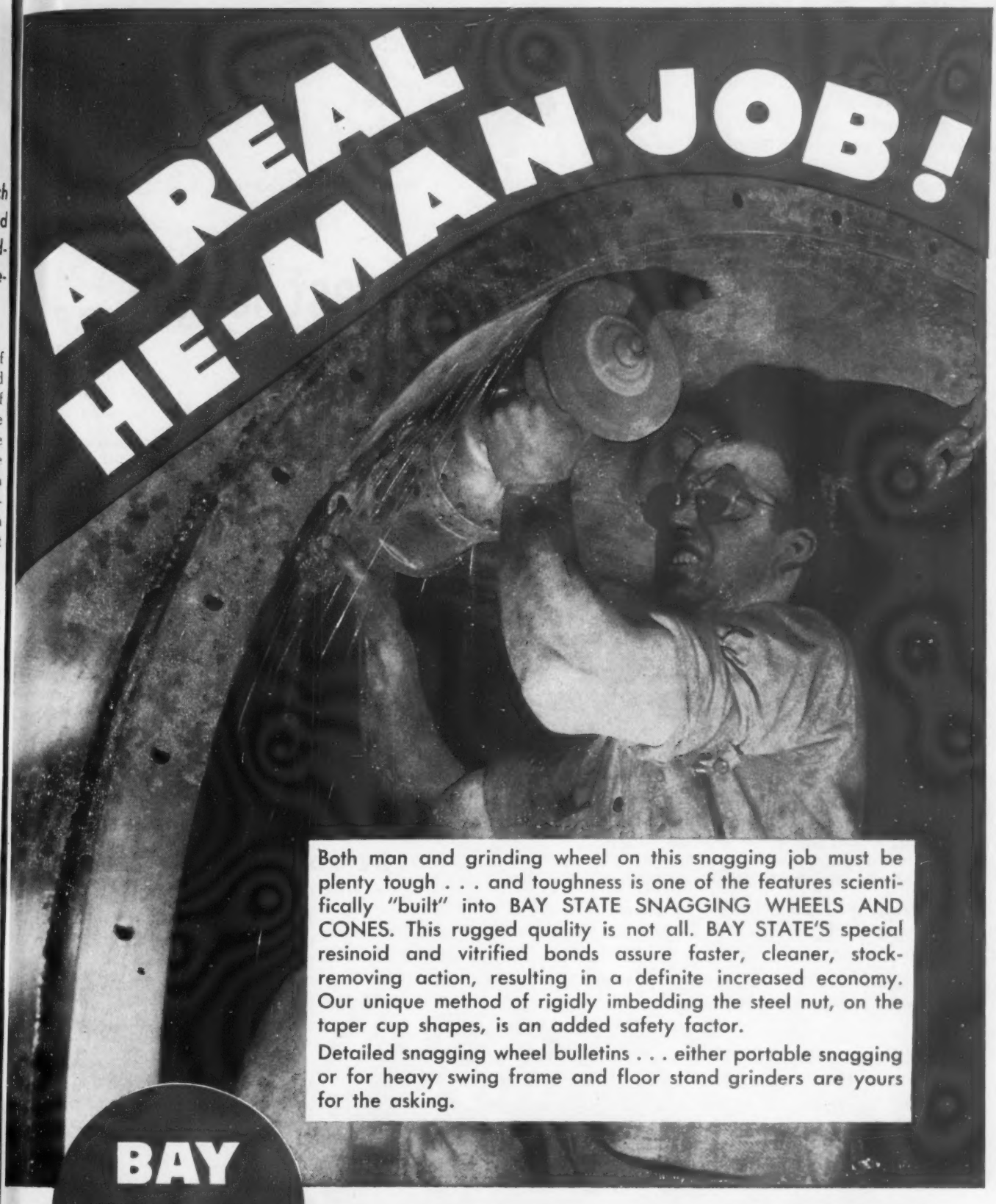
Fig. 3—In snap gage processing, reaction of both sides of grinding wheel is major test for relative accuracy of spindle

Fig. 4—Full chuck capacity is utilized in surface grinding plug gages. Both ranges of traverse and transverse movements are fully used

IN ANY analysis of our system of producing interchangeable machined parts, the fundamental importance of efficient grinding operations cannot be overlooked. This is especially true of the horizontal spindle-traverse table type surface grinder without which precision gage blocks (Fig. 2), measuring devices, tools and instruments, all of which make mass production possible, could not be economically processed.

Ground surfaces of microinch accuracy are the result of a combination of factors, including design for scientifically balanced weight, convenient means of operation, simplified hydraulic mechanism and lubrication system, co-ordination of grinding wheel and spindle for continuous rather than intermittent performance, dust control, development of coolants and chuck holding power.

To eliminate vibration for 100 per cent balance, it is imperative that all components be designed for relative weight and be expertly machined and assembled. There must be perfect co-ordination between traverse, transverse and vertical movements; these must respond uniformly throughout the entire range of travel. "Liquid" powered or hydraulically functioning traverse or transverse feeds are of particular importance since only hydraulic power can provide the desirable cushioned cut-off at the end of each longitudinal stroke and



Both man and grinding wheel on this snagging job must be plenty tough . . . and toughness is one of the features scientifically "built" into BAY STATE SNAGGING WHEELS AND CONES. This rugged quality is not all. BAY STATE'S special resinoid and vitrified bonds assure faster, cleaner, stock-removing action, resulting in a definite increased economy. Our unique method of rigidly imbedding the steel nut, on the taper cup shapes, is an added safety factor.

Detailed snagging wheel bulletins . . . either portable snagging or for heavy swing frame and floor stand grinders are yours for the asking.

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They make the lubricant last longer...

Yes, whatever the load, speed or service requirements of the installation, Torrington Needle Bearings help conserve lubricant... prolong its effective life.

That's because there is an extra margin of lubrication efficiency in Torrington Needle Bearings due to their basic design . . . *the turned-in lips of the hardened retaining shell which provide a natural reservoir for retention of the lubricant.* At the same time this same feature helps to exclude dirt and dust from vital bearing surfaces. The lubricant is kept clean and free from contamination. Consequently, bearing wear is minimized ...less frequent renewal or replacement of the lubricant is required . . . maintenance costs are substantially reduced.

If you are seeking an anti-friction bearing for an application where high capacity, small size and economical cost are important design considerations, Torrington Needle Bearings may be *your* answer! You'll find a wealth of pertinent data in our Catalog No. 32, available on request. If you have a specific application in mind, our engineering department will gladly give you specific recommendations.

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an infinite range of table speeds. Hydraulic systems are now simplified to the point that all actuated movements are controlled by means of a single unit. thus eliminating all customary piping and previously required adjustments.

Forced feed lubrication as applied to a surface grinder has many advantages, since oil flow to the ways can be controlled to lubricate them adequately.

When a spindle is the source of vibration, many surface grinders are raised to full efficiency simply by substituting the original spindle with one substantially more rigid and modern. As the heart of the machine, the spindle governs to a large degree the outcome of all surface grinding operations, Fig. 3.

We refer, of course, to ball bearing type spindles, assuming that they function in perfect static and dynamic balance. The fact remains that design varies; this is especially true in regard to mounting the bearings. Precision steel balls will retain their spherical shape permanently only when the ball bearings are mounted so that the point of contract between bearings and races changes with each revolution of the bearing.

Balance of Wheel Maintained

A grinding wheel even slightly out of balance will not produce a microinch finish no matter how carefully it is dressed. Wheels for wet grinding should not be used for dry grinding. Preserving the original dimension of the wheel bore is as important as preserving the size of a reamer. So important are the grinding wheels that they are now really "tailor-made" for surface grinding. Static balance to the accuracy of a small fraction of an ounce is considered as important as grain, grade, bond and structure.

Although chucks of the electromagnetic type have had little change in design for several years, electronics makes them more versatile, than ever, Figs. 1, 4. It is now possible to regulate the amount of magnetic pull to suit the size of the work; and all residual magnetism is removed in less than 15 sec. Heavy work is easily released without injury to the chuck, and thin flat pieces may be accurately and parallel surface ground. This latter operation has heretofore been a real problem on both production and tool work.

Except for the scientific development of improved dust-collecting devices, and grinding coolants, microinch precision grinding would not be realized. There are four types of dust collectors now industrially used namely, bag, filter, centrifugal force and oil bath.

Cutting tool life and performance are continuing to benefit from improved straight cutting and soluble oils that were great assets to war production. Most significant in reducing cutting fluid costs and improving production are the new graphitized soluble oils. Particularly important is the colloidal or artificial graphite type cutting medium.

When mixed in correct proportion, the specially processed oil serves for general cutting purposes except for a very few applications. This product is the result of a unique method of homogenizing whereby the colloidal graphite becomes perfectly and permanently suspended in the highest grade of carrier oil. Used for compounding as a grinding coolant, the improved soluble oil has numerous properties in line with modern precision grinding requirements.

The oil readily emulsifies with water in any of the standard proportions up to and including one part oil to 80 parts water. Such properties as fine wetting action and freedom from foaming are helpful for rapid removal of heat and its uniform distribution throughout the piece being ground. The emulsion has reasonably low surface tension casing particles of abrasive and metal in the stream to be readily precipitated at the bottom of the tank. This is essential because the least amount of grit recirculated through the system will impair the surface being ground. The emulsion has maximum rust inhibiting properties, and ground surfaces will not darken even if not wiped dry.

The advantages of a good coolant system are manifold and cannot be over-estimated. Not only must the coolant be selected with care but the flow must necessarily be adequate, uniform and clean, if temperature to minimize distortion is to be maintained. Regardless of the fineness of the grinding operation, without proper coolant, minute scratches will appear when the surface is being lapped.

When it is realized that, taking a normal depth of cut, temperatures at the point of wheel-work contact often reach 2200° F for hard steels and 1500° F for mild steels, it is easily understood that these temperatures must be absorbed so as not to spoil accuracy.

For a typical example, let us consider what actually takes place in surface grinding a piece of steel used to make a 3-in. gage block. For every temperature rise of 1°, the piece increases in size by 6½ millionths of an inch. On removing the piece from the magnetic chuck, it might have been heated to 150° or approximately double normal temperature. Since the piece being ground can easily increase 0.0005-in. in size, it is not surprising that so much attention must be paid to functioning of coolant system.

RAIL CROPPING: Three point contact automatically square-cut positions this portable rail cropping machine manufactured by Air Reduction Sales Co., New York, for use by railroad maintenance departments. Supplied with upper and lower torches, machine requires two cuts to crop a rail. First cut is made across ball and half way down the web; second is made across bottom of the base and up through the web to meet the first cut. Torches are joined together by 5/16-in. hose with tee connections so that both can be operated from a pair of pressure regulators

Jim Smith's Son

COST JIM'S EMPLOYER

$4,109.16

Jim Smith's son was born last week. He cost Jim's employer over $4,000.

Jim has had pretty heavy expenses lately. His little girl was taken to the hospital three months ago for an emergency operation. Now, the baby. Jim has worried a lot about the doctor and hospital bills.

Yesterday he had an accident, because his mind wasn't on his work.

Workmen's compensation insurance will pay Jim's doctor and hospital bills. It will pay his weekly compensation benefits. But it will not pay him for his suffering. Nor will it pay for the damage to the machine or the material spoiled. That will cost his employer $4,109.16—which does not include the lost time of dozens of other men who saw the accident and stopped to talk about it, and who will worry about it for days afterwards.

Employers Mutuals write:

Public Liability . . . Automobile . . . Plate Glass . . . Burglary . . . Workmen's Compensation . . . Fidelity Bonds . . . Group Health, Accident, Hospitalization . . . and other casualty insurance . . . Fire . . . Tornado . . . Extended Coverage . . . Inland Marine . . . and allied lines of insurance. All policies are nonassessable.

Branch offices in principal cities. Consult your telephone directory.

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OFF THE JOB... this complete 24-hour protection provides peace of mind for your employees

supplement your workmen's compensation insurance, mployers Mutuals of Wausau provide for complete 24-hour protection for employees and their families through Group Health, Accident, and Hospitalization insurance.

This plan can be tailored to your requirements. It can ve varying degrees of protection to various types of orkers, as desired. It assures you, and your employees, that they are protected—on the job or off the job, for 24 hours a day—it frees them from worry about medical, surgical, and hospital bills for themselves and for their dependents.

Peace of mind is the greatest single contribution you can make toward the efficiency of your employees. With it, they work better and produce more; the accident rate drops, and with it the cost of your other insurance.

Investigate this plan now. Call the nearest Employers Mutuals office, or write Insurance Information Bureau, Employers Mutuals of Wausau, Wausau, Wisconsin.

ON THE JOB... safety engineering cuts down accidents, saves manhours, reduces insurance costs

Workers naturally prefer pay checks to compensation checks. When you carry Employers Mutuals Workmen's ompensation, E-M Safety Engineering helps keep your nployees on the job and out of the hospital.

his service cuts accident frequency rates substantially—with resulting savings in insurance costs. Savings often an from 20 to 40%—in many cases even more.

M safety engineers, experienced through years of contact in many plants, are able to eliminate many sources of danger you might not notice. They help you plan and organize a program to interest and instruct the workers in safety so that they will understand how taking time to be safe saves time. Coordinated with the safety engineering work, Employers Mutuals industrial nurses help set up a plant nursing service to guard the health of employees and render efficient first aid.

When there are accidents, claims are given prompt attention. If he needs it, the injured worker is treated in one of Employers Mutuals modern physiotherapy laboratories, which speeds his recovery and many times prevents permanent disability. Employers Mutuals often spend more for rehabilitation than compensation would cost.

E-M Engineering Service, by reducing accidents, reduces time lost by valuable employees. It benefits the worker who doesn't get hurt, as well as the employer whose insurance cost is lowered when accidents do *not* happen.

HOW Employers Mutuals of Wausau Make Insurance Understandable

Because of the serious loss that may arise from lack of understanding, Employers Mutuals endeavor to make insurance understandable, through:

- ... representatives trained to help the buyer understand his insurance;
- ... insurance survey service, which provides policyholders with an analysis of their insurance coverage—what they have, and what they need for full protection;
- ... an advertising program dedicated to giving *information* about insurance; and ...
- ... A Dictionary of Insurance Terms—How to Understand Insurance and Buy It Intelligently. Over 200 words and phrases defined in simple ABC English, with examples of specific applications.

FREE

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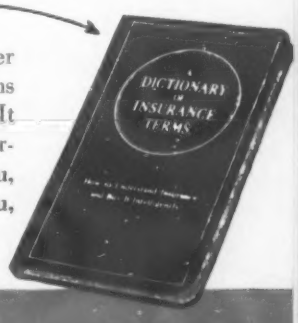

make Insurance Understandable

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ESTABLISHED 1911
EMPLOYERS MUTUAL FIRE INSURANCE COMPANY
ESTABLISHED 1935
Home Office: WAUSAU, WISCONSIN

Manufacturer Says

Unfair Tests Restrict Arc Welding Applications

September 16, 1946

Mr. Irwin H. Such, Editor
Steel
Penton Building
Cleveland 13, Ohio

My dear Mr. Such:

Arc welding has been of decisive importance to America. Arc welding did more than most other manufacturing processes in the producing of the tools of war during World War II. Arc welding has produced a record for reliability in billions of welds, made over many years, that is unmatched by any other manufacturing process, yet arc welding is being attacked in a way which is tremendously handicapping its application, and promises still more to interfere with its future use.

This attack is aimed not at the process, as such. It is obvious such tactics would fail. The attack consists in throwing suspicion on the process by writing into specifications expensive and impractical tests which have little to do with the excellence of the weld. Most of them have to do with infinitesimal variations of no possible importance, but of great cost. The attack has already eliminated the economic use in many proper applications. If continued, it will soon eliminate many others.

We see, for instance, the ruling that welds must be x-rayed, which increases the cost by several times, yet the commercially welded joint is always of greater strength than the parent metal and is tremendously stronger than any riveted joint, where x-raying never has been suggested.

We see riveted joints which are made tight by caulking. This process is accepted without question. The resulting undercut is enormous, yet a welding undercut that is infinitesimal is frequently made reason for rejection of welds.

We see welds chipped out, rewelded, and welded vessels rejected because of trifling defects such as infinitesimal porosity either on the surface or beneath, yet parent metal in the same structure with defects much greater, and whose weakening effect would be tremendously more serious, are accepted without question.

We see welding electrode specifications being written which enormously increase the cost of production with no increase in either the reliability nor in the excellence of electrodes. Rivets have no such test to handicap them.

While welding electrode is tested in every conceivable and nonsensical way, no one suggests any test on a rivet, yet the riveted joint is always the weakest spot in any structure. This is never true of a full-sized welded joint.

Much time and expense is used in testing electrode deposit to make sure it has great ductility and the weld is rejected if the ductility is low, yet riveted joints have no elongation and are accepted without question.

The contour of the deposit of a weld is a matter of very close inspection, yet no one examines the contour of any rivet or the hole it only partially fills.

All insured vessels must have their welds x-rayed and any weld is rejected if any infinitesimal defect is found, yet no one x-rays a riveted joint nor rejects it because of the voids between the rivets and the rivet holes which are known to be always present.

Because of the higher elastic limit of the weld metal, there is no load that can be put on a welded structure in which the weld is of equal or greater section than the parent metal which can affect the weld in any possible way until great distortion of the rest of the structure has taken place. Such distortion would make that structure valueless for its intended purpose, yet all this testing and rejecting listed above is made mandatory in many welded structures—never in riveted structures.

Further instances of the same kind can be cited by the scores. The examples shown are sufficient for the author's purposes.

Welding over the years has done a more reliable job than the rivets it has replaced. That record is conclusive. The engineering profession, which relies so completely on welding in so many cases, must recognize and resist this studied attempt to eliminate the arc welding process. The attack has already eliminated the economic use of welding in many structures. The success of such an attack on this tremendously valuable method is neither good advertising for the engineering profession nor good ethics for those involved in the attack. It is time we dealt with reality.

Very truly yours,

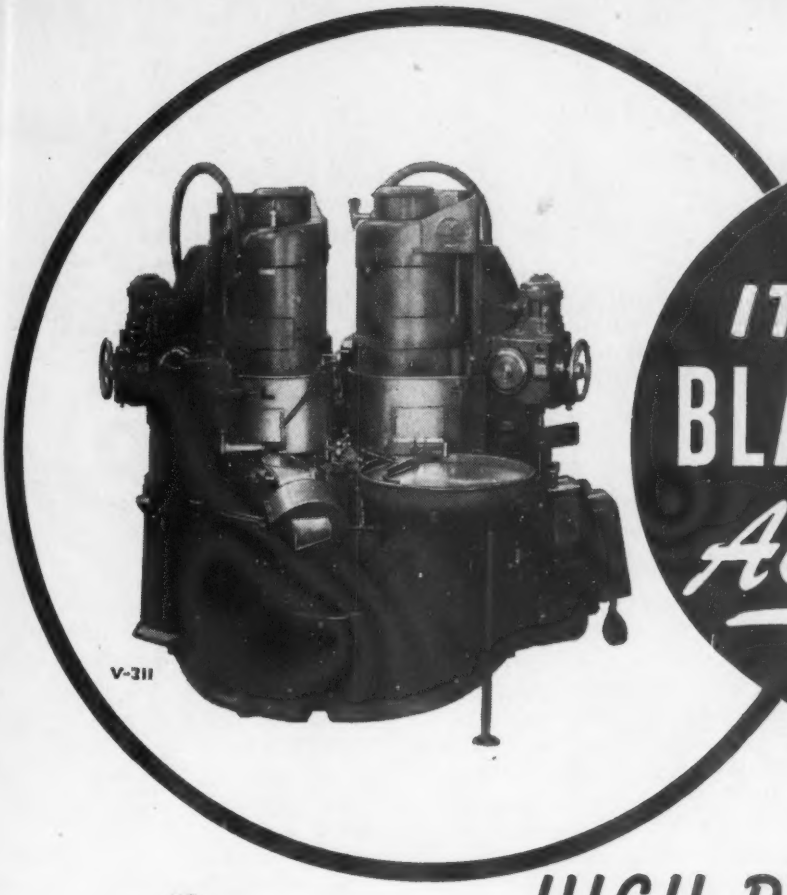
(Signed) J. F. Lincoln
President
THE LINCOLN ELECTRIC COMPANY

Vapor Sand Blast Unit Cleans Ships' Hull

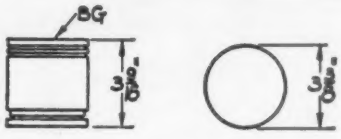
Importance of removing old, well-anchored layers of paint on ships' hulls before refinishing was recently demonstrated by research conducted by Bakelite Corp., 30 East 42nd street, New York, working under contract with the Office of Scientific Research and Development. Old paint which had formerly been considered a protection was found to cover up considerable corrosive action.

Combination wet abrasive impact method, using vapor and sand blast unit developed at Mare Island Navy yard was found to produce an exceptionally clean surface in short time. Other processes tested by researchers included an impact cleaning tool consisting of a high-speed revolving master wheel and groups of cutter wheels which flaked off coatings of rust or paint.

Report of the study is available, at $3 each for photostats and 50c for microfilm, from Office of Publication Board, Department of Commerce, Washington.



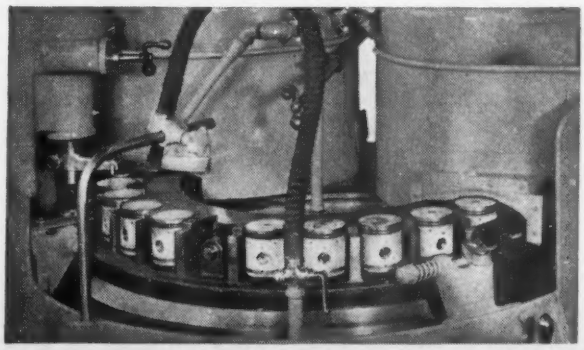
PUT IT ON THE BLANCHARD *Automatic*



HIGH PRODUCTION WITH FINE FINISH

A high rate of production with a very fine finish is obtained by Blanchard Automatic Grinding the top ends of cast iron pistons. Stock removal is 1/32" to limits ±.0025" and 600 pieces (one side) are ground per hour.

On this job the Blanchard 16-A2 automatic surface grinder utilizes a 26 station rotating fixture. The pistons are located on studs which fit the piston pin holes. Squaring is done from the sides of vertical vees in which the pistons are held by a stationary spring loaded steel band.



Each grinding wheel is controlled by its own caliper so that a definite amount of stock is left by the first wheel for the finishing wheel to remove. The finishing wheel caliper controls the final size. This is all done with one pass under the wheels.

The Blanchard 16-A2 Automatic Surface Grinder is particularly suited to work requiring fine finish and close limits with high production.

Send for your free copy of "Work Done on the Blanchard", third edition. This new book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

BLANCHARD

The BLANCHARD MACHINE COMPANY

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Hot-Dip Galvanizing Practice

By WILLIAM H. SPOWERS JR.
President
Spowers Research Laboratories Inc.
New York

METHODS of handling work into the galvanizing kettle have been adapted to the sal ammoniac used as a fused flux on the zinc. Generally substances like bran, oatmeal, sawdust, tallow or glycerin are added to the fusion in small amounts to stabilize the froth, reduce fuming and economize in its use. A suitable technique has been evolved for all types of objects galvanized which varies only slightly, probably to gratify the whim of an operator. Such a system is weak, however, in that it is not easy to anticipate flux exhaustion and this condition is learned from the appearance of faulty work or is avoided by extravagant use of the sal ammoniac at frequent intervals. Too much is left to the operator to assure work of uniform quality at reasonable costs. An automatic supply of new flux producing material as a film on the entering work is helpful in solving this probelm. Such a flux film may provide all the material or less than half, depending on the rate of supply resulting from the conditions under which the work is placed in the zinc kettle.

An important difference between the customary use of sal ammoniac on the kettle and the supply of zinc ammonium chloride is that sal ammoniac added periodically is used not only to supply new cleansing material but also as it volatilizes, to stir up the heavy exhausted flux and distribute it through the mass of the fusion and thus reduce the adhesion of the flux to the work passing through. Since with a zinc ammonium chloride flux wash each entering piece of work carries substantially all the flux required for its galvanizing, the flux box technique becomes one of more frequent skimming to remove exhausted flux and avoid spotting. This is not troublesome or costly in the use of flux.

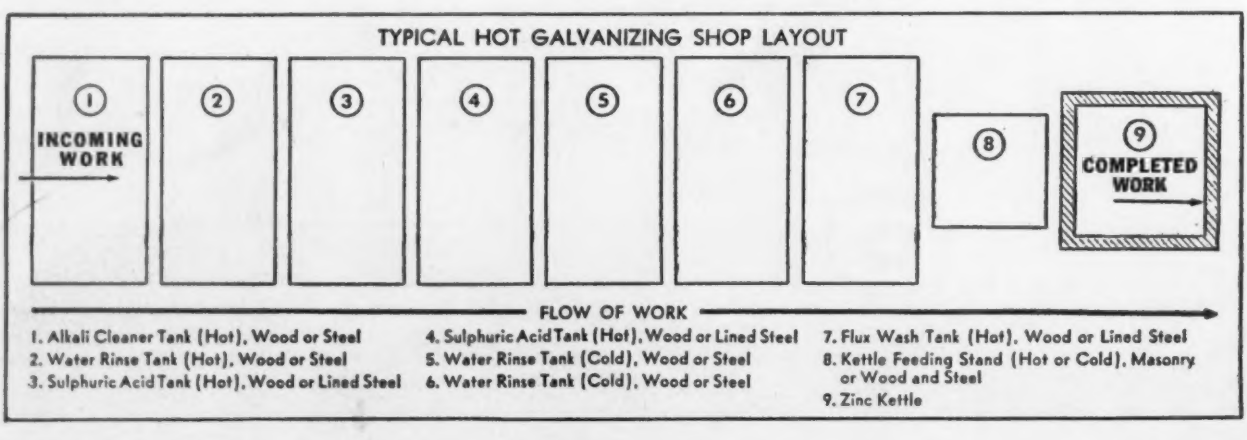
Not infrequently galvanizers have considered it economical to prepare a zinc chloride flux wash by dissolving zinc in hydrochloric acid. This would be satisfactory if a zinc chloride solution could be produced with no free acid. Having extra undissolved zinc present in the tank does not meet this situation fully, with the result that there is free acid available to create iron chloride on the work. A zinc chloride produced as a chemical product which, in solution, will show an analysis as being possibly 0.2 to 0.5 per cent basic (calculated as zinc oxide) is preferable. Such a zinc chloride makes suitable flux washes but has less value as a kettle flux. Such a flux wash requires the use of sal ammoniac or zinc ammonium chloride on the zinc kettle and tends to complicate the process without having any economic or technical advantage.

Some galvanizers have considered it an economical advantage to use their dross pigs to make zinc chloride. This is unsatisfactory because the iron in the dross again appears in the system to make more dross. One manufacturer using dross to make zinc chloride found upon investigation that his dross production was at the rate of about three times the average of the industry for his product before he remedied his practice.

Zinc chloride solutions are seldom as dilute as 35° Be (1.3182 sp gr) and generally are more concentrated in order to provide a flux film on the work that will have sufficient rust retarding value to be effective.

Zinc ammonium chloride, and preferably the specific form of this compound containing 3 mol of ammonium chloride commbined with 1 mol of zinc chloride, is increasing in use both as a flux wash, and as a volatile kettle flux. As a wash, it provides an effective rust retarding film on the work and on the kettle acts efficiently as a volatile flux. As before indicated, the essential steps to secure the highest quality galvanizing possible

Fig. 29—Typical hot galvanizing shop layout


TYPICAL HOT GALVANIZING SHOP LAYOUT
1
INCOMING WORK
2
3
4
5
6
7
8
9
COMPLETED WORK
FLOW OF WORK
1. Alkali Cleaner Tank (Hot), Wood or Steel
2. Water Rinse Tank (Hot), Wood or Steel
3. Sulphuric Acid Tank (Hot), Wood or Lined Steel
4. Sulphuric Acid Tank (Hot), Wood or Lined Steel
5. Water Rinse Tank (Cold), Wood or Steel
6. Water Rinse Tank (Cold), Wood or Steel
7. Flux Wash Tank (Hot), Wood or Lined Steel
8. Kettle Feeding Stand (Hot or Cold), Masonry or Wood and Steel
9. Zinc Kettle

YOUR SCRAP-PILE CAN FILL A LOT OF ORDERS

Steel products *you are waiting for* are being held up because of the shortage of scrap metal. The production of many of the things you need is being slowed up . . . will be interrupted unless steel mills continue to get a larger supply of scrap iron. More than half of the steel used in America requires scrap for its production. *You can help.* Turn your worn-out iron and steel products into cash . . . help the steel mills turn it into steel products you need. Call your scrap metal dealer . . . move your scrap-pile immediately.

All Continental products are made from open hearth steel and are uniformly processed and finished according to the needs of their use. Increasing Continental production is "stepping up" shipments of steel sheets, wire, Chain Link fence, farm fence, roofing, etc. More scrap metal means even more Continental products for you.

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ROLLS

through the use of zinc ammonium chloride, are thorough pickling and rinsing, followed by the prompt coating of the work in process with a protecting film of the salt by use of a flux wash. Present day practice falls within the various steps shown diagrammatically in Fig. 29 which is a typical layout. Duplicate tanks for a single step in the cycle are preferable for the sake of thoroughness of treatment or for working capacity.

Zinc ammonium chloride flux washes are made by dissolving the proper weight of the salt in cold water. An all-wood tank is to be preferred but if this is not available then a lead-lined steel tank may be used. If the flux wash is to be heated, lead pipe should be employed. Since the flux wash is in reality an electrolyte, corrosion between pipe and fittings or along the weld seams of the iron pipe will soon start and result in contamination and operating inconveniences. No attempt should be made to heat the flux wash by use of an open steam line because of the difficulty in maintaining a uniform concentration of the flux wash, a desirable feature. Table III gives data on zinc ammonium flux wash densities and composition.

Dissolving zinc ammonium chloride in water yields a solution of larger volume than that of the water used. This effect increases as the concentration of the zinc ammonium chloride increases. It is hardly noticeable below 10°Be. At 20°Be the volume increases beween 20 and 25 per cent and at about 30°Be the volume is increased about 50 per cent. This means, therefore, if 3.26 lb of zinc ammonium chloride is dissolved in 1 gal of water at 20°C (60°F) the resulting solution will not read 21.4°Be (see Table III) because there will be almost 1¼ gal of liquid containing 3.26 lb of the salt and the hydrometer will read more nearly 17°Be. On the other hand if 3.26 lb of the salt is dissolved in 0.8-gal of water the result will be about 1 gal of a flux wash which will have a strength reading about 21.4°Be.

It may be of interest to note here that to a limited extent some galvanizers treat their exhausted flux skimmings with water and attempt to use these leachings as a flux wash. Almost invariably these leachings will contain zinc chloride and ammonium chloride present in the molecular ratio of 1:1, that is, there will be approximately 71.8 parts of zinc chloride found for every 28.2 parts of ammonium chloride present in the leachings. This water soluble part of the spent flux is in reality the unconsumed residue of the original flux, the remaining portion being the infusible and insoluble complex zinc-oxy-compounds. In practice these leachings perform about on a par with zinc chloride as a flux wash. Replacing them with zinc ammonium chloride leads to galvanized coatings with greater adherence and ductility.

TABLE III—ZINC AMMONIUM CHLORIDE DENSITY DATA AT 20° C

Grams Salt in 100 C.C. Water	°Be	Specific Gravity	% Salt By Weight	Wt. Per Gal, Lb	Wt. of Salt in 1 Gal Solution, Lb
10	7.45	1.052	9.09	8.76	0.79
20	11.8	1.088	16.67	9.06	1.51
30	15.5	1.120	23.08	9.34	2.16
40	18.7	1.148	28.55	9.57	2.73
50	21.4	1.173	33.33	9.78	3.26
60	23.6	1.194	37.50	9.95	3.73
70	25.9	1.217	41.17	10.15	4.18
80	27.8	1.237	44.45	10.3	4.57
90	29.6	1.272	47.40	10.48	4.96
100	31.0	1.280	50.00	10.62	5.31

The 1:1 molecular ratio of zinc chloride to ammonium chloride confirms conclusions reached that it is the most stable ratio for these two compounds at the temperature of the zinc kettle and leads to the belief that this more tightly bound ammonium chloride is not readily available for such cleansing work as must be done in the flux box. Also it supports the recommendation of frequent removal by skimming of the hard, infusible, totally-exhausted flux thus giving this more stable fluid fusion a better chance to function properly.

Since the most important duty of the flux wash is to protect the pickled and rinsed work the wash must be held at a fairly constant strength so that the film formed as the work is removed from the flux wash tank will be uniform. The effect of water being introduced into the flux tank by the rinsed work, of flux wash removed from the work and of evaporation can be controlled by a simple method. The proper solution level on the side of the flux tank should be marked and the desired flux wash strength establish by experience. These two standards should be maintained by making additions once daily or at less frequent intervals as operating conditions indicate just so that the concentration does not vary more than about 1°Be total range.

TABLE IV
pH VALUES THROUGH USEFUL RANGE OF CONCENTRATIONS IN DISTILLED WATER.

°Be	Zinc ammonium chloride, lb per gal at 30° C	pH
6	0.51	4.76
8	0.89	4.56
10	1.20	4.41
12	1.53	4.28
14	1.90	4.17
16	2.24	4.09
18	2.60	4.03
20	2.99	3.97
22	3.38	3.93
24	3.81	3.90
26	4.22	3.86
28	4.65	3.84
30	5.15	3.82

Water solutions of zinc ammonium chloride of the 1:3 ratio have pH values in the acid range so that they should be looked upon as acid electrolytes. This means that some attack can and does occur between various pieces of iron or steel in any flux wash. This stops as soon as the flux-dipped work has dried in air on removal from the flux wash tank. Table IV gives these pH values through the useful range of concentrations in distilled water. These data have been obtained by electrometric measurements. Fairly consistent and accurate readings may be made in comparator

(*Please turn to Page* 172)

Fig. 30 — Small parts galvanizing with electric controls

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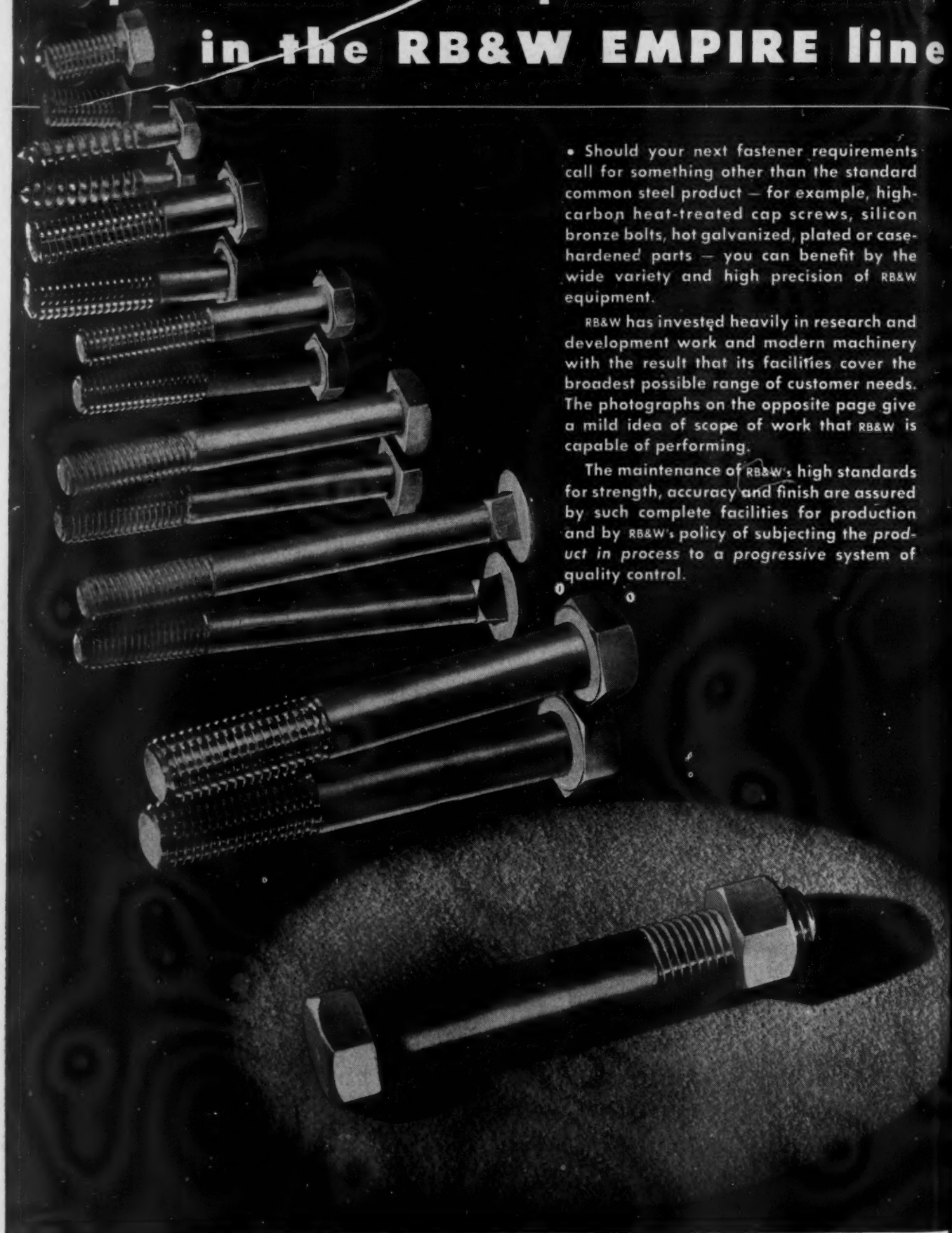
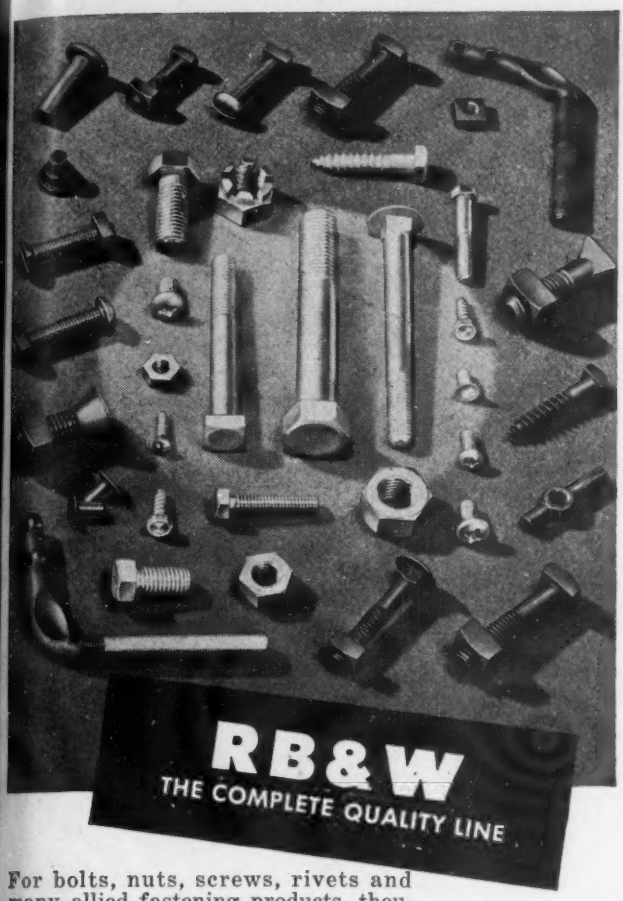


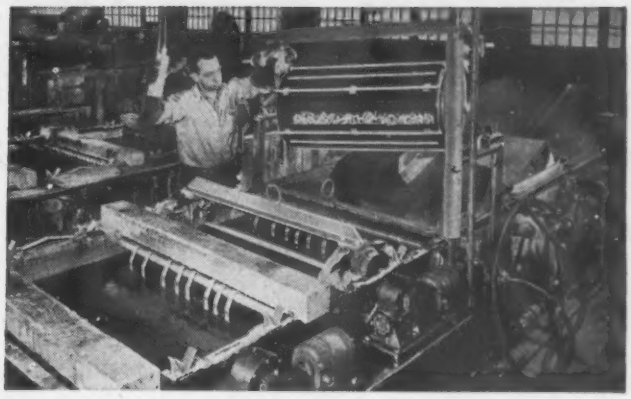
• Should your next fastener requirements call for something other than the standard common steel product — for example, high-carbon heat-treated cap screws, silicon bronze bolts, hot galvanized, plated or case-hardened parts — you can benefit by the wide variety and high precision of RB&W equipment.

RB&W has invested heavily in research and development work and modern machinery with the result that its facilities cover the broadest possible range of customer needs. The photographs on the opposite page give a mild idea of scope of work that RB&W is capable of performing.

The maintenance of RB&W's high standards for strength, accuracy and finish are assured by such complete facilities for production and by RB&W's policy of subjecting the *product in process* to a *progressive* system of quality control.

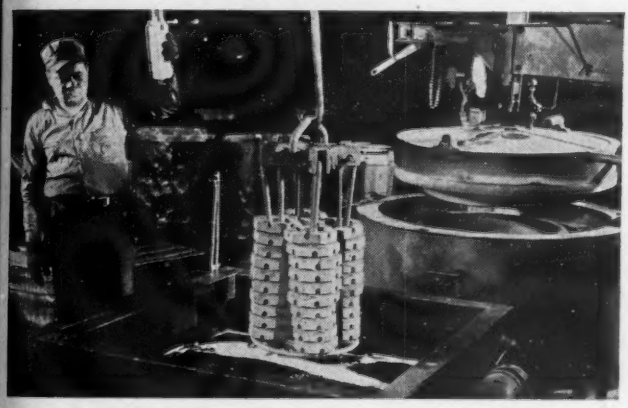


For bolts, nuts, screws, rivets and many allied fastening products, thousands of industrial firms rely upon the RB&W EMPIRE brand. Experience has shown that the extra effort RB&W puts into engineering the accuracy and dependability of its product, results in savings in assembly time, in maximum holding power and excellent appearance.



PLATING—Part of RB&W's plating department — equipped for hot galvanizing, electrolytic plating, lead coating, Parkerizing, Cronak finishing, etc.

HOT GALVANIZING—One of the steps in RB&W's carefully controlled hot galvanizing process — best method of rust-proofing steel.



CARBURIZING—Where severe wear conditions require a deep and uniform case, carburizing is recommended. Cases 1/32" deep can be obtained in these furnaces.

SURFACE-HARDENING—Greater skin hardness and better wearing surfaces are obtained from specialized treatment in these cyanide pots.

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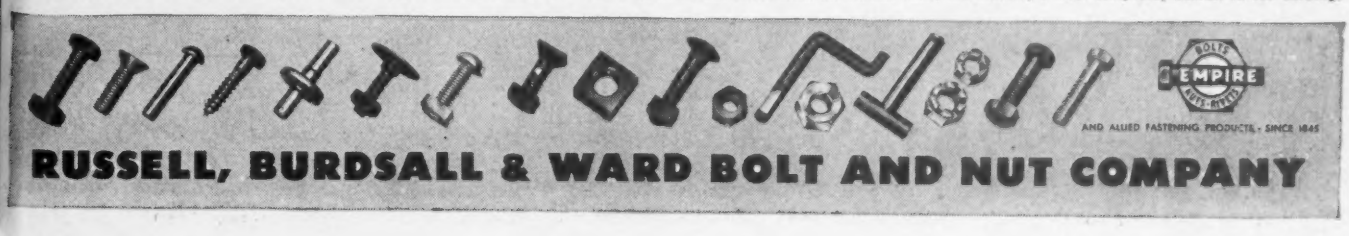


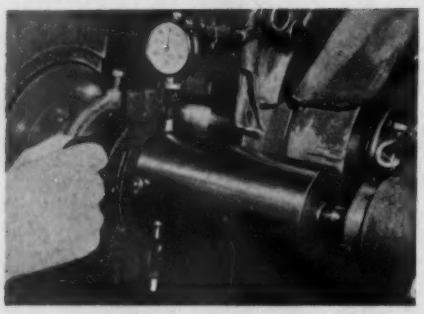
RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

Industrial Equipment

Demagnetizer and Etcher

Fine deep etching on polished steel surfaces is performed by tungsten marking point on combination etchtool and demagnetizer, immediate left, designed by Luma Electric Equipment Co., Toledo 1, O. As a demagnetizer, the 20-lb unit is especially valuable for demagnetizing tools that have been in contact with a magnetic chuck. Flat top grid construction spreads and fades the magnetic field to zero, thus demagnetizing small and irregularly shaped parts as well as long bars and blocks.

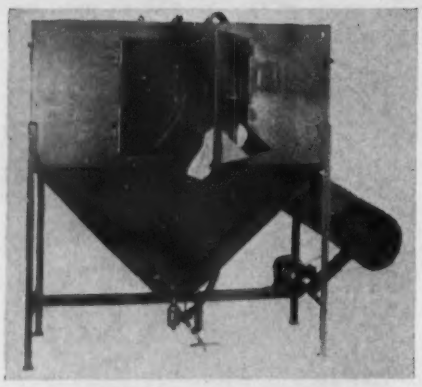
Steel 10/7/46; *Item No.* 9837



Dial Snap Gage

Demountable heads and extension spacers are features of Decimatic dial snap gage, immediate left, developed recently by Standard Gage Co., Poughkeepsie, N. Y. Using an extension spacer, gage is adjustable over a range of 1 in. It is operated by passing over work piece and noting greatest deflection of dial hand. Both gaging pins are surfaced with cemented carbide to reduce wear.

Steel 10/7/46; *Item No.* 9833

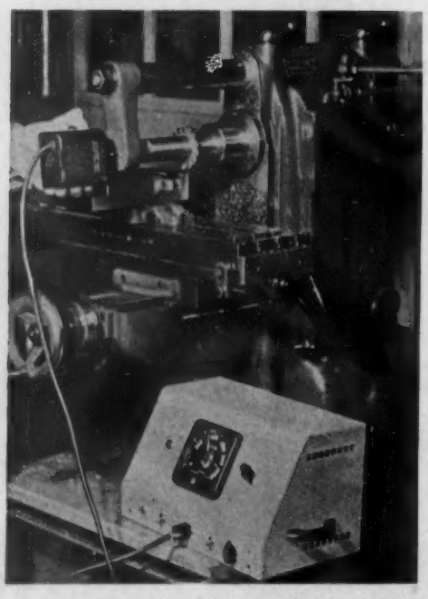


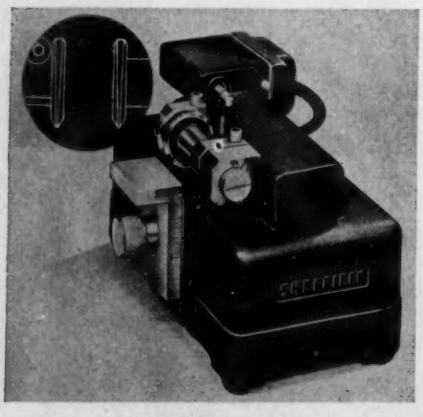
Sandblaster

Self-feeding sand blasting machine, immediate left, recently developed by Leiman Bros. Inc., Christie street, Newark 5, N. J., handles small articles such as bolts. It is equipped with a motor-driven rotating basket for tumbling work, and a sand magazine from which sand is sprayed on the work by means of a nozzle.

Feature of the machine is a combination door including armholes with cuffs that can be readily opened for loading or unloading either the work or the rotating basket. When sandblasting larger pieces of work, basket can be detached quickly from the cabinet. Operator then holds the pieces under the nozzle in the cabinet, turning them over until cleaned.

Steel 10/7/46; *Item No.* 9764





Electronic Tachometer

Speeds from 300 to 50,000 rpm are measured by new electronic tachometer, left below, consisting of a small pick-up head, 6 ft of flexible cable and a measuring unit with a panel-mounted indicating instrument. Recently announced by the Special Products Division of General Electric Co., Schenectady, N. Y., the new 19-lb instrument is useful for production testing equipment instantaneously without need for permanent attachments.

Steel 10/7/46; *Item No.* 9836

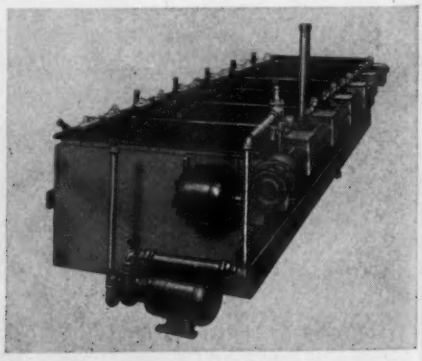
Lead Check

Adjustable truncated cylindrical gaging anvils on new production lead checking instrument shown below, are said to make possible precision checking of thread lead within a range of 4½ to 60 threads per inch to an accuracy of 0.0001-in. Developed by Sheffield Corp., Dayton, O., instrument is useful in checking production parts such as aircraft components, studs, small shafts and similar units. Inset shows tapered truncation which permits gaging of various pitches without changing anvils.

Steel 10/7/46; *Item No.* 9832

Plating Apparatus

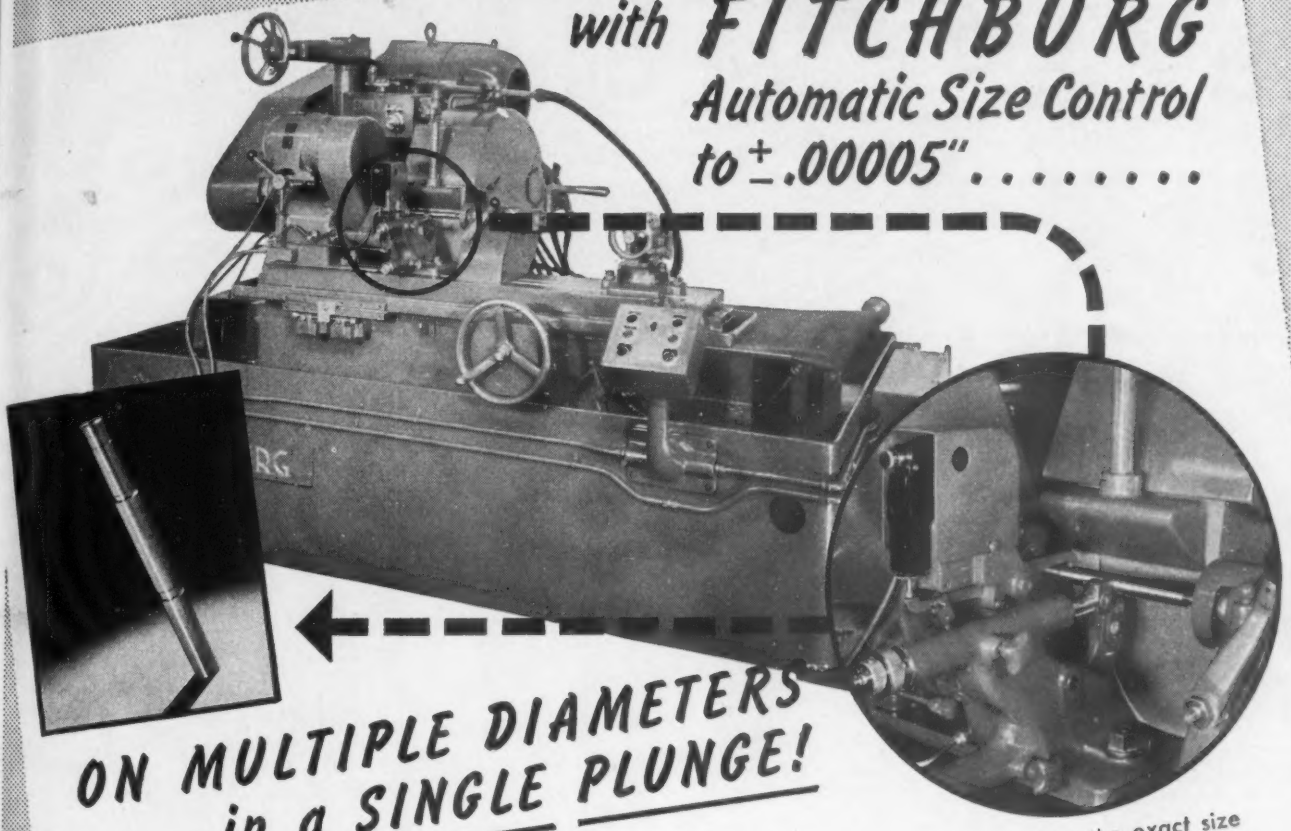
Entire layout of the plating barrel, tank and pumping equipment, immediately below, shows new combination plating apparatus and pump developed by Hanson-Van Winkle-Munning Co., Matawan, N. J. According to the company, tests show that plating time is reduced when plating unit is furnished with pumping equipment. One such installation cut cadmium plating time 20 to 25 per cent. In working with cyanide solutions, cyan-



(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 148.)

TOMORROW'S High Production NOW!

with FITCHBURG Automatic Size Control to ±.00005" . . . . . .



ON MULTIPLE DIAMETERS in a SINGLE PLUNGE!

With FITCHBURG'S Automatic Size Control and Multiple Grinding you can easily beat the steadily rising costs of operation. These combined features are exclusively Fitchburg's—no other manufacturer of cylindrical grinding equipment has them . . . because no other manufacturer has been asked by industry to create and develop so many high-production, single-purpose, cylindrical grinding machines.

The Automatic Size Control is not a dial to be operated by the operator . . . it's not a costly electronic gadget which can get out of order easily and needs an expert to maintain. It is an inexpensive, simple, mechanical arrangement employing the principle of low increment feed which goes into operation automatically at the completion of the automatic cycle Bowgage wheel feed. A push-button starts the grinding—the machine automatically stops when the exact size is reached.

The FITCHBURG illustrated has a Heavy-Duty Bowgage Head employing two wheels on the same shaft: one 6¼" and the other 2" wide. It grinds two diameters on the illustrated washing machine shaft at the same time in a single plunge. The tolerance, in this case, ±.0001" on both diameters is no problem for the Automatic Size Control. Customers' engineers from headquarters couldn't believe their own eyes, but it still is a fact.

We may already have a Special Fitchburg designed to meet your specific needs. You'll be surprised at the number of operations that can be done at one setting, size held to tolerances previously not attempted—and all on a very high-production basis. Drop us a line today.

FITCHBURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U. S. A.

Manufacturers of—Bowgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Both Full Universal Grinders and Special Purpose Grinders

ide consumption is cut, and carbonates in bottom of tank are reduced in volume.

Steel 10/7/46; *Item No.* 9831

Threading Tool

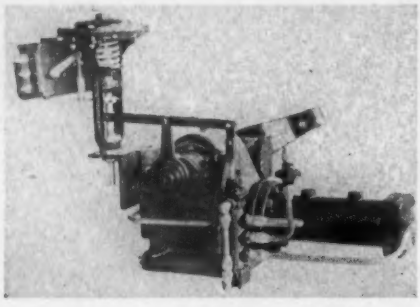
Announcement of a new line of standard carbide tipped threading tools, Style M-15, is made by Metro Tool & Gage Company, 4240 West Peterson avenue, Chicago 30. Tools in the line are of the 60-degree, V-nose type. Primary clearance at the nose is 5 degrees, with a secondary clearance of 6 degrees.

Tips are of a tough, wear-resistant grade of carbide suitable for long run threading of steel parts.

Steel 10/7/46; *Item No.* 9719

Booster Cylinder

Latest development of Askania Regulator Co., 1603 South Michigan avenue, Chicago, is an oil-operated hydraulic booster cylinder for air operated controllers. Using a standard diaphragm top it provides high power amplification and



permits exact positioning of heavy dampers, valves and the like in accordance with the applied pneumatic loading pressure, usually 0-15 psi.

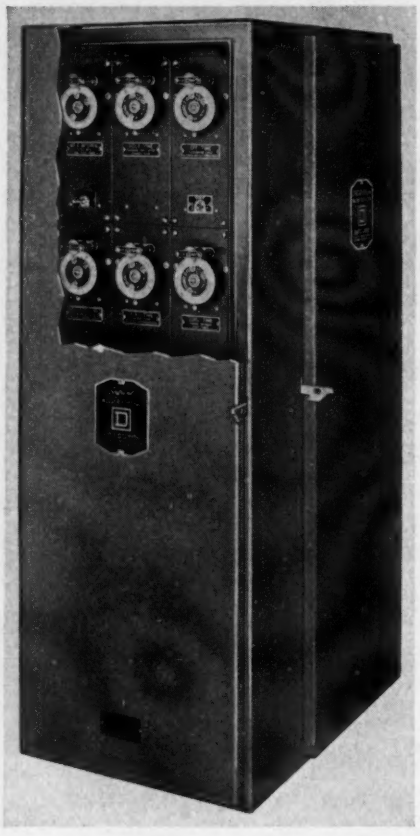
Cylinder may be of the crank type, as shown, or of the straight reciprocating type. Straight cylinders are offered up to 8 in. bore and 30-in. stroke. Other types of remote positioning cylinders are also offered using electric instead of pneumatic transmission.

Steel 10/7/46; *Item No.* 9680

Welder Control

Automatic control of air-operated resistance welding machines is provided by the Class 8992 combination control unit designed by Square D Co., 4041 North Richards street, Milwaukee 12. A Syncro-break welder contactor and Safront sequence-weld timer are both included in a single enclosure arranged to mount on right hand side of machine with all control elements within reach of operator.

Foot switch, pressure switch, no-weld switch and timer control circuits operate at 110 v and are isolated from the power supply to give the operator added safety. Solenoid air valve may be energized from either power or control supply sources by simple reconnection. Con-

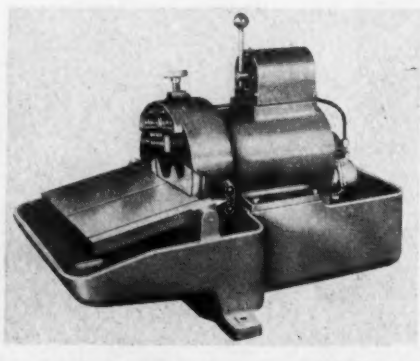


trollers have tapped primary control transformers which can be connected for operation at 110, 220, or 440 v, 60 cycles; or for 380 v 50 cycles.

Steel 10/7/46; *Item No.* 9674

Grinding Machine

A bench-type grinding machine for sharpening carbide tools with a steel-bonded diamond wheel is announced by Wickman Corp., 15533 Woodrow Wilson avenue, Detroit 3. Widely accepted in



England, machine is now available in United States and Canada.

Ample power for full use of a steel-bonded diamond wheel is provided by the 1-hp spindle motor. A coolant pump is furnished as standard equipment, with a reservoir cast in the base of machine.

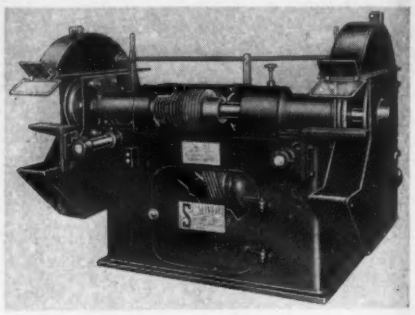
For convenience in sharpening both right and left-hand tools, the direct-driven grinding wheel is reversed by a switch on the top of the motor. Wheel guard can be swiveled to right or left as required and clamped in position by a thumbscrew. The 8 x 12 in. table of the machine is quickly set at any angle from 5 degrees above horizontal to 15 degrees below.

Steel 10/7/46; *Item No.* 9661

Multiple Speed Grinder

Standard Electrical Tool Co., 2504 River road, Cincinnati 4, announces a multiple speed snagging grinder available in sizes for 18 to 30 in. wheels.

Illustration is of No. 30 for 30 in. diameter, 2 to 4 in. face by 12 in. bore grinding wheels. Three spindle speeds are provided so that grinding efficiency may be maintained throughout wheel life



merely by changing spindle speed as wheels reduce in diameter.

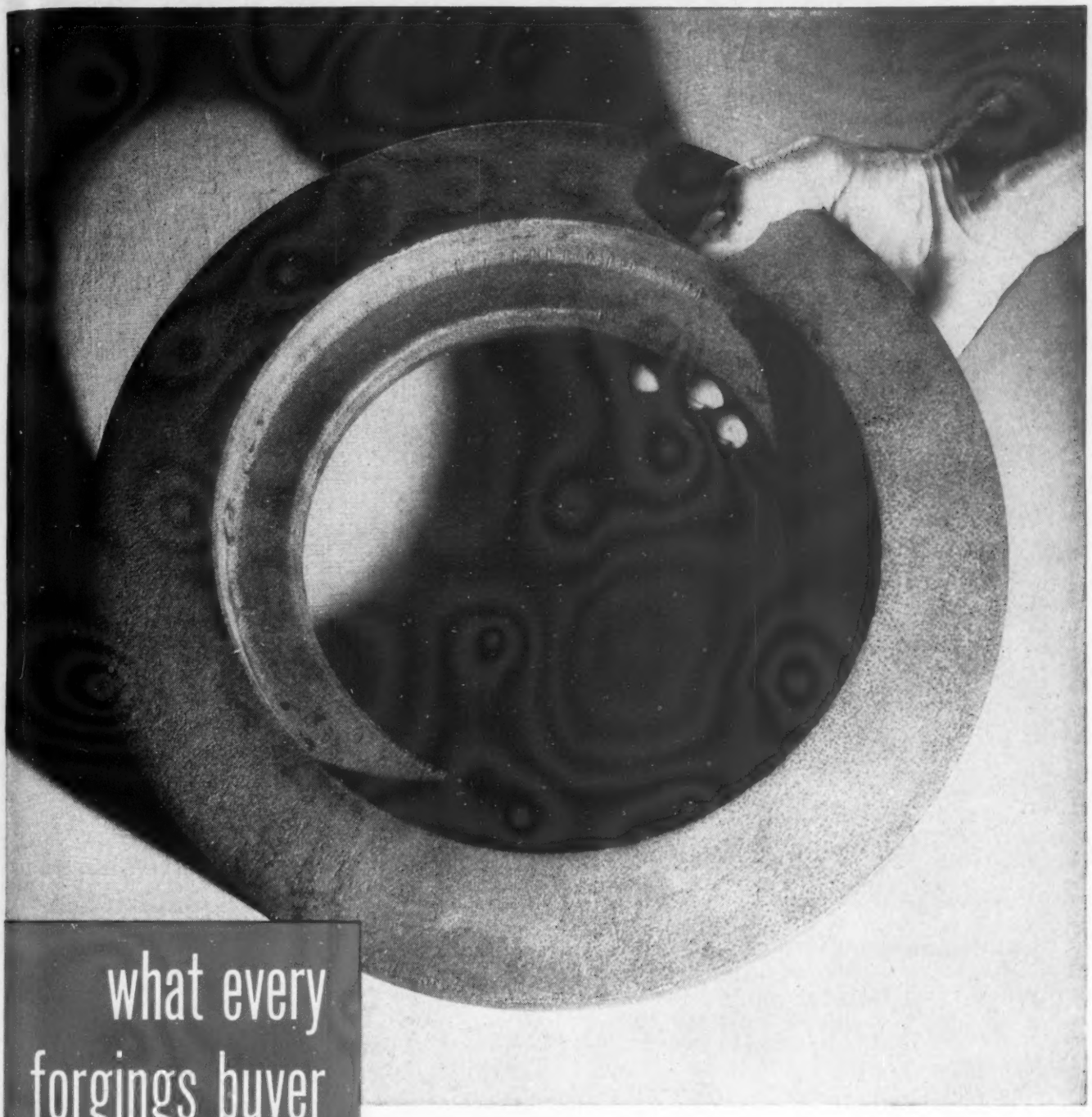
Power is transmitted to the grinding spindle through multiple V-belt drive. The adjustable sheave on grinding spindle is accessible through a hinged cover. Guards are of boiler plate steel, with adjustment to compensate for wheel wear, each fitted with adjustable spark breaker and shatter proof glass eye shield. Cut-away views are of 3-step sheave on grinding spindle and motor drive.

Steel 10/7/46; *Item No.* 9672

Live Center

Live center with hardened and ground interchangeable points and heavy duty, precision combination bearings which absorb both radial and thrust loads is announced by Royal Products, 68 Spring street, New York 12. Centers are lubricated with grease through the opening formed by removing the shank. They are sealed against foreign matter and cutting oils. By turning at higher speeds, these

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 148.)



what every forgings buyer should know

TUBE TURNS is a good source for forgings of this type. Forgings which require a maximum of *forged* tensile strength. Forgings which must be economically turned out in mass-production quantities. TUBE TURNS' forge shop is exceptionally well organized for this specialized work with a complete range of modern high-speed mechanical presses and upsetters, including the largest. These are closely coordinated under one roof with TUBE TURNS' own first-rate die design, die-making, laboratory, and rough machining facilities. Tube Turns (Inc.), Louisville 1, Kentucky.

District offices at New York, Washington, D. C., Philadelphia, Pittsburgh, Cleveland, Detroit, Chicago, Houston, San Francisco, Los Angeles.

TUBE TURNS tt *Forgings for Industry*

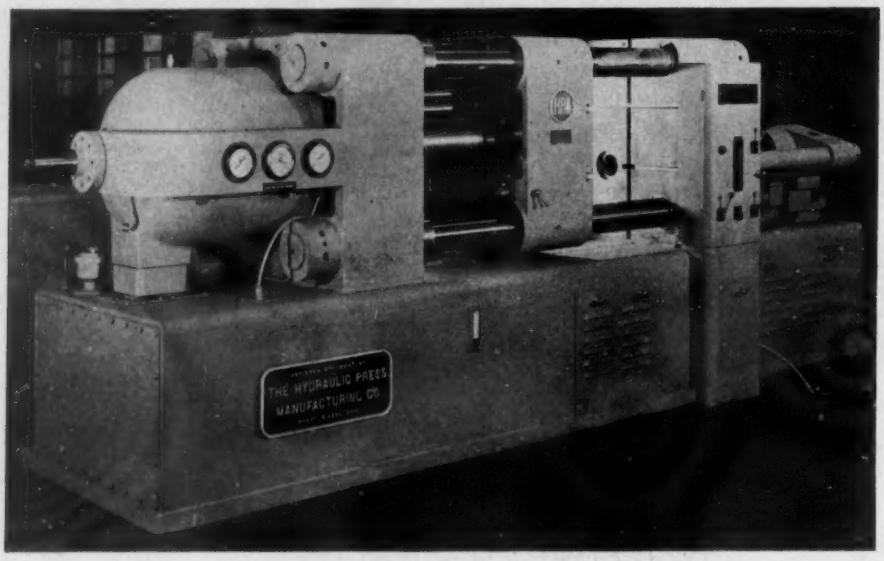
centers allow deeper cuts to be made, and eliminate burned-out and scored center holes.

Steel 10/7/46; *Item No.* 9582

Die Casting Machines

Mold clamping, metal injecting, core pulling and ejecting units are all operated hydraulically in the model 400-A and 400-M die casting machines being built by Hydraulic Press Mfg. Co., Mt. Gilead, O. Straight-line hydraulic mold clamp assures accurate mold alignment, keeping scrap loss at a minimum.

Machines are capable of injecting from



12½ to 100 cu in. of aluminum, copper or magnesium alloy per cycle in a projected area of casting including gate of 19 to 126 sq in. Horizontal by vertical mold space is 23 x 38 in. and injection pressure is up to 50,000 psi. Effective plunger stroke is 10 in.

Steel 10/7/46; *Item No.* 9675

Conveyor Elevator

Cable-lift device for facilitating elevation of delivery head end of Stevedore Jr. series of portable power belt conveyors is reported by Rapids-Standard Co. Inc., Grand Rapids, Mich. Adjustment of conveyors now is accomplished by turning the lifting crank handle. Improvement is designed so present users of the above conveyor may purchase the complete front cable-lift assembly for modernizing their equipment.

The cross-supporting T-arm of the standard support is fitted with a rachet pawl, a rachet and a drum. The steel, flexible cable is wound on the drum and is securely attached by a cable hook to the traveling cross T-arm. Clockwise turning of the crank winds the cable over the drum and pulls the entire T-arm assembly forward on the main conveyor frame channel, thereby elevating the delivery head end.

Steel 10/7/46; *Item No.* 9644

Circular Cutter Bit

Fearless Tool Co., 1234 Gramercy place, Los Angeles 6, announces the production of the shearcutter boring, turning and facing tool with a precision tool holder, for use on lathes, screw machines, drill presses and boring machines. Feature of tool is circular cutter bit which is fastened to end of a holder that is specially designed for this purpose.

Penetration angle is such that a shearing action is attained and as a result of this knife-like action, mirror-like finishes are produced. From 20 to 50 new, sharp cutting edges may be presented to work by rotating the bit, thus eliminating necessity of stopping production to resharpen cutting tool.

Steel 10/7/46; *Item No.* 9716

Switchboard Tachometer

Speeds as low as 1 rpm or ¼ fpm may be measured with the series of 40B tachometers which are available for continuous indicating or recording application. Manufactured by Metron Instrument Co., 432 Lincoln street, Denver 9, they are useful for measuring extrusion speeds in metal processing mills.

Device consists of a tachometer head and an indicator or recorder which may be mounted any distance from the head. While electric in nature, the tachometer is based on a new principle. Head is a simple contact-making mechanism which is connected in series with a reactance and the indicator to a voltage source so that the current flowing through the indicator is directly proportional to the speed. Operating power is obtained from

110 v 60 cycles and the calibration is unaffected by changes in line voltage.

Steel 10/7/46; *Item No.* 9679

Magnetic Starter

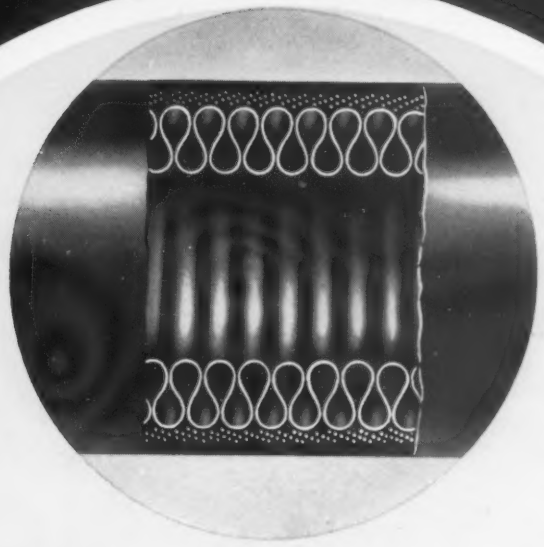
Master Electric Co., 126 Davis avenue, Dayton, O., is announcing an across-the-line magnetic starter with single push button feature for starting and stopping. With single control, button is pressed once and the motor starts. Pressed again, the motor stops.

Starter provides: Low voltage and overcurrent protection; solenoid construction with vertical straight line motion; long wearing silver alloy bridge-type movable contacts with each bridge

having contacts on both sides so the bridge may be removed and turned over to provide new contact surfaces; sturdy silver stationary contacts on arc resisting insulating block.

Standard voltage ratings are 115 and

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 148.)



Flexible ASSEMBLIES

FOR HIGH VACUUM DUTIES . . . .

In molecular distillation, and for certain electronic applications, a vacuum as high as one-tenth of one micron is not at all uncommon. That starts to get pretty close to the theoretical "perfect" in vacuum language. The problem of piping, however, is another matter for engineers, especially wherever flexible connections are needed for such purposes as coupling mechanical pumps to the system being evacuated.

American Flexible Bronze Seamless Tubing has turned out to be an excellent solution to the problem for various reasons: first, being absolutely seamless it is fully capable of holding such high vacuum; second, because it is uniformly corrugated it offers extreme "bend-ability" providing simplicity of installation; third, since it possesses such flexibility it becomes an absorber preventing transmission of pump vibration to the vacuum system. In addition, American Seamless can be assembled to withstand unusual abuse and will serve long and dependably with a minimum of maintenance. Because of its construction, American Seamless can take up slight expansion and contraction, thus making it possible to maintain pumping speed — an important consideration in pulling a vacuum.

American Seamless Flexible Metal Tubing can be supplied in many styles from the simplest unbraided flexible tube to a rugged wire braided assembly with molded-on synthetic covering such as shown above.

Where the requirements for a flexible vacuum or suction line are somewhat less exacting — such as for sucking away fumes, chips or light dry materials — *American* manufactures other styles of Flexible Metal Hose from practically any workable alloy and in sizes ranging from ½" to 12" inside diameter.

The whole story is given in our catalog, a copy of which will be sent on request. Specific information on industrial applications is given on the reverse side of this sheet.

46338

American Metal Hose

THE AMERICAN BRASS COMPANY — AMERICAN METAL HOSE BRANCH

General Offices: Waterbury, Conn. Subsidiary of Anaconda Copper Mining Company

In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

ANACONDA
from mine to consumer

Engineered

FOR SPECIFIC INDUSTRIAL APPLICATIONS

STEAM LINES

Full-interlocked bronze for toughest steam hose requirements, sizes up to 8″ I.D.; extra flexible wire-braided steam hose where extreme "bend-ability" needed, sizes to 1¼″ I.D.; seamless flexible bronze steam hose for connecting moving parts, sizes to 4″ I.D.

OIL LINES

Full-interlocked galvanized steel for hot tar or asphalt, road oils, unloading fuel oil, etc., sizes up to 8″ I.D.; extra-flexible wire-braided steel for high pressure grease lines; oil feed and coolant lines for machine tools; seamless for lubricating moving parts.

AIR AND GAS LINES

A complete line of flexible connectors for carrying air and gases (propane, butane, manufactured, natural, hydrogen, oxygen, acetylene and others) is available in a full range of sizes and in various alloys.

CHEMICAL LINES

Distilleries, filter press manufacturers, medical and chemical firms regularly use *American* for handling or transferring chemicals.

CONDUITS

A full line of conduits for covering electrical wiring on domesti appliances, machine tools, etc. can be furnished in brass, bronz stainless, aluminum or galvanized steel.

VIBRATION ABSORBERS

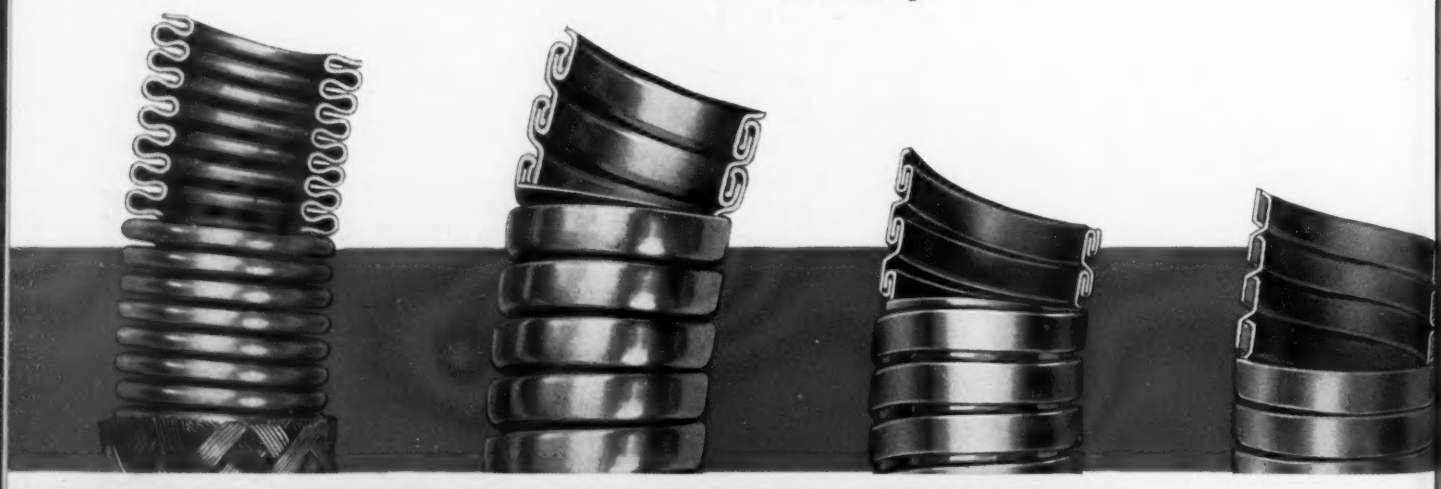
Where compressor or pump vibration constitutes a seriou menace to rigid piping, a short section of American Seamless absorb the vibration, eliminates possible trouble. Likewise on Diesels *American's* flexible exhaust hose takes up vibration, prevent shearing of bolts, cracking of castings.

MISALIGNMENT CONNECTORS

Assembling components of heavy machinery, such as sectiona boilers, oftentimes can be accomplished more quickly and mor economically where tappings are slightly out of line — American Seamless does the trick.

CONNECTORS FOR MOVING PARTS

Wherever moving parts of machinery must be heated with steam cooled with water, or lubricated, no better way has been found than to convey the heating, cooling or lubricating agent through Flexible Metal Tubing.



American Metal Hose

THE AMERICAN BRASS COMPANY — AMERICAN METAL HOSE BRANCH

General Offices: Waterbury, Conn. Subsidiary of Anaconda Copper Mining Company

In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

ANACONDA
from mine to consumer

230 (dual voltage) for single phase, and 110, 208, 220, 440 and 250 for polyphase motors.

Steel 10/7/46; *Item No.* 9664

Bending Brake

Material clamping action in the Di-Arco brake No. 4, manufactured by O'Neil-Irwin Mfg. Co., 304 Eighth avenue South, Minneapolis 15, makes possible extremely sharp bends. Its double edge

vertical folding plate allows close reverse bends to be formed.

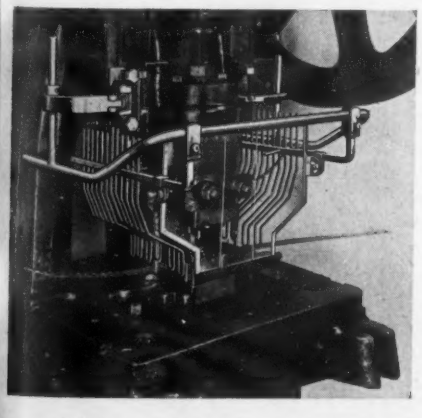
Brake has a material capacity of 16-gage sheet steel and a maximum forming width of 24 in. Roller bearings increase speed and ease of operation, and adjustable material gage assures precision in all duplicated parts.

Unit will readily duplicate complicated parts in a great variety of ductile materials including such metals as copper, bronze, stainless steel, aluminum and bimetals.

Steel 10/7/46; *Item No.* 9681

Die Closure Safety Guard

An easily adjusted swinging die closure which affords operator protection and at the same time permits easy and safe



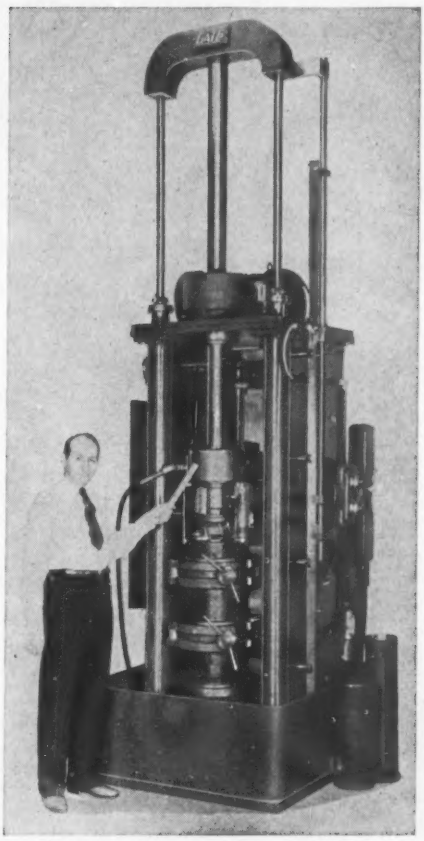
accessibility to dies is recent development of Junkin Safety Appliance Co., Tenth and Hill streets, Louisville. Guard is adjustable vertically and horizontally and swings out of the way. Once gate is out of position, the press cannot operate until guard is returned to position.

Splinter proof telescoping transparent plastic front shield affords full unobstructed view of operating zone and formed individual wire side shields permit close operation to the die. Wire shields are removable. Die closures are custom built to fit the press on which it is to be used.

Steel 10/7/46; *Item No.* 9683

Vertical Boring Machine

Vertical boring machine for precision rough and finish boring of large cylinders up to 40 in. in length and from 6 to 8



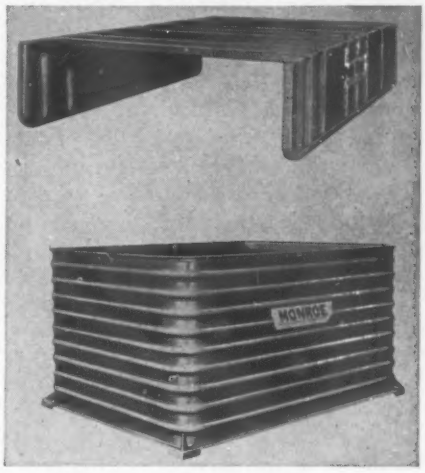
in. in diameter is announced by Giern & Anholtt Tool Co., 1315 Mt. Elliott avenue, Detroit 7. The machine, identified as TR model, is equipped to bore cast iron, steel or nonferrous tubes employing the use of a multiple blade boring cutter.

Hydraulically operated the machine has a feed of 8 in. ID tubing of 4 ipm in roughing and 4½ to 5 ipm in finishing. Power requirements on the operation are approximately 10 hp. Coolant provisions are incorporated with the direct flow of coolant over cutter for entire depth of cut. Fixture is of the self-equalizing type.

Steel 10/7/46; *Item No.* 9660

Handling Equipment

Monroe Auto Equipment Co., Monroe, Mich., is producing a line of materials handling equipment built of weight-saving high tensile steel. Included in the line are three wood and steel pallets,



two steel pallets and two wood and steel platform skids. Said to effect weight savings up 40 per cent, a platform box, offered in three sizes, also is offered. The unit illustrated above is the basic platform skid and that below is the nestling ring, both offered in two sizes.

Steel 10/7/46; *Item No.* 9638

Peening Hammer

An air-powered model 7002, peening and scaling hammer, is being produced by Aro Equipment Corp., Bryan, O. Capable of removing scale and rust on

welded parts, it can also be used for removing sand on small castings and peening tubular rivets and other small parts.

Tool delivers 5000 blows per minute, yet will not distort light sheet metal

(All claims are those of respective manufacturers; for additional information fill in and return the coupon on page 148.)

when removing scale. Overall length of the hammer head is 2½-in. and the tool is 7 in. in length. Body of tool is cast aluminum with automatic throttle valve.

Steel 10/7/46; *Item No.* 9671

Turntables

Whiting Corp., Harvey, Ill., introduced a turntable recently which, due to the weight being carried on a ring of 1-in. diameter ball bearings, allows the load to be turned to any position, almost without effort. The turntable top (plain, grooved, raised track, or checkered) is carried on hardened steel balls, running in a specially machined ball-race to permit wide distribution of load and easy operation.

A quick-acting, foot-operated release lock, at table top level, holds table securely in position. Top overlaps bottom casting to prevent accumulation of dirt. Standard sizes range from 42 to 96-in. diameter.

Steel 10/7/46; *Item No.* 9621

Grinding Wheel

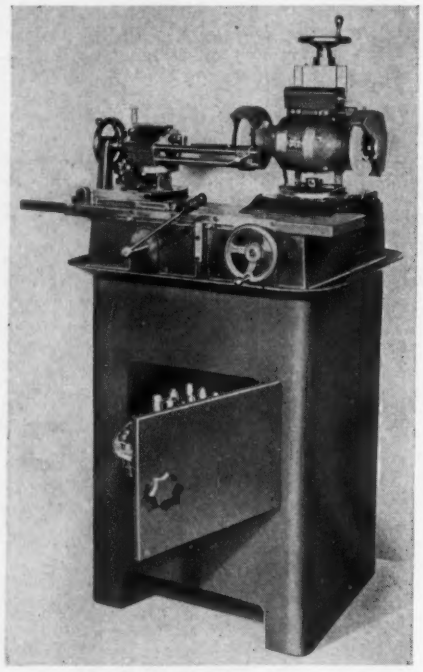
DoAll Co., Minneapolis, announces a new all-purpose grinding wheel capable of grinding any kind of material, including hardened alloy tool steel, annealed steel and stainless. Wheel works equally well for heavy fast roughing cuts and fine finishing. It produces a finish comparable to that of a 300-grit wheel on all types of grinding machines.

Bond used in making these wheels is insoluble. Open structure is such that the work remains cool even when dry grinding. Wheels are available in types No. 1, (straight), No. 5 (recessed one side) and No. 7 (recessed two sides) with sizes ranging from 1 to 14 in. in diameter by ¼ to 3 in. in thickness.

Steel 10/7/46; *Item No.* 9718

Tool Grinder

Tool grinding machine that makes radial-helix relief grinding easier than angular back off relief grinding is announced by D-S Grinder Division of Royal Oak Tool & Machine Co., Royal Oak, Mich. Using this machine any desired margin may be left on the side blades. Radial and helical relief can be produced simultaneously and can be varied to suit all practical requirements.



Cam and index plates provide for grinding any tool of 1 to 12 flutes with identical relief on each blade. Machine can be used for relieving end cutting, form, taper and side cutting tools as well as for grinding flutes or any other tool grinding operation. Tools are supported rigidly between centers or in a collet.

Steel 10/7/46; *Item No.* 9670

Carbide Reamers

New line of heavy duty solid shank and shell type expanding reamers, featuring full-length carbide cutting edges to permit reaming operations at high speeds, is announced by Metro Tool & Gage Co., 4240 West Peterson avenue, Chicago 30.

Reamers are designed with a low expansion angle to lessen outside diameter grinding when resharpening, and have a 1/16-in. blade overhang to increase rigidity without loss of chip clearance, permitting long reamer blade life. Reamers are available in cutting diameters of 1 to 6 in. Shell arbors are furnished with straight or Morse taper shanks.

Steel 10/7/46; *Item No.* 9717

Pressure Gage

Large dial size pressure gage is announced by United States Gauge Division of American Machine and Metals Inc., Sellersville, Pa. Designated as Supergauge, it is for heavy duty industrial service. Internal parts are of noncorrosive metals, and working elements are designed to withstand repeated pulsation and vibration as well as abnormally high over-pressures.

Gages are made in pressures ranging from 30 to 10,000 psi and come in 4½, 6 and 8½-in. dial sizes. They are suitable for use on boilers, diesel engines, hydraulic equipment, and compressors.

Steel 10/7/46; *Item No.* 9612

FOR MORE INFORMATION on the new products and equipment mentioned in this section, fill in this form and return to us. It will receive prompt attention.

Circle numbers below corresponding to those of items in which you are interested:

9837	9661	9683
9833	9672	9660
9764	9582	9638
9836	9675	9671
9832	9644	9621
9831	9716	9718
9719	9679	9670
9680	9664	9717
9674	9681	9612

10-7-46

NAME ..... TITLE .....

COMPANY .....

PRODUCTS MADE .....

STREET .....

CITY and ZONE ..... STATE .....

Mail to: STEEL, Engineering Dept.—1213 West Third St., Cleveland 13, Ohio

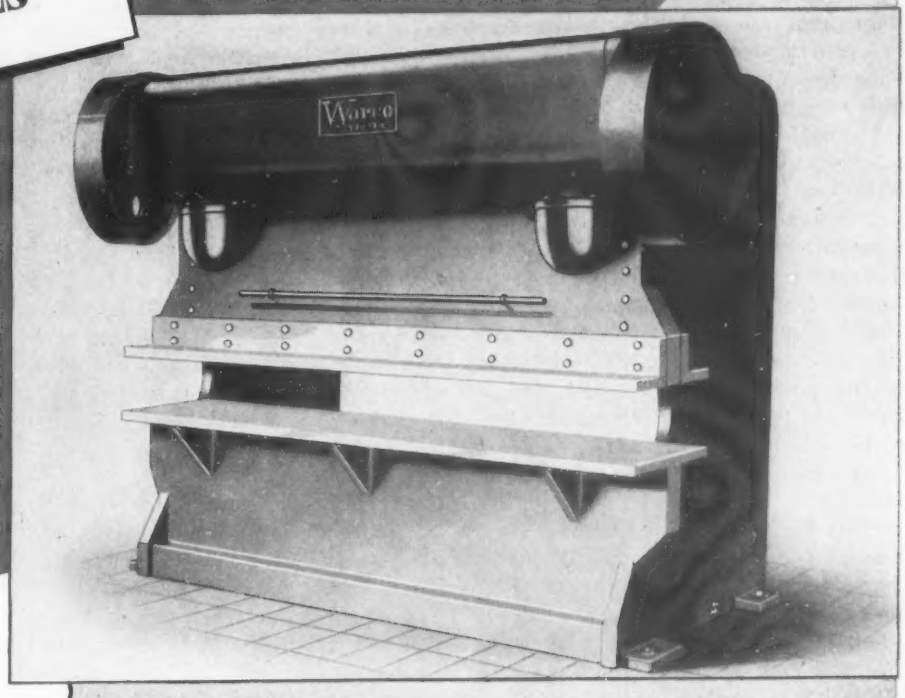
(All claims are those of respective manufacturers; for additional information fill in and return the coupon on this page.)

We are in a position to handle your order **AT ONCE!**

Warco PRESSES

WELDED-STEEL CONSTRUCTION

Weldments fully stress-relieved



Mechanical Press Brakes

Warco mechanical press brakes are built in capacity range from 100 to 1000 tons, to handle lengths up to 24 feet and longer. Low overall height, compactness and extra long gibways are features.

Warco Advantages:

THE MOST MODERN OF WELDED-STEEL PRESSES

★

PROMPT DELIVERY

THE NEW and complete line of Warco welded steel presses and press brakes is designed and built to give fabricators full advantage of the most recent improvements in press construction. Stress-relieving of all weldments helps assure unchanging rigidity, maximum accuracy, strength and endurance.

Welded steel construction makes it possible to embody special features of design for special manufacturing. The wide range of sizes provides a Warco welded steel press for virtually every type of stamping, drawing, blanking and coining requirement.

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ECCENTRIC GEAR PRESSES — OBI PRESSES — HYDRAULIC PRESSES

Machining Stainless Steel

(*Continued from Page* 118)

rake angles tend to "hog in" causing the chrome-nickel grades to work-harden. To prevent rubbing, side clearance angles may have to be increased.

Here is a tip on sharpening cutting tools. The finer the cutting edge is ground and stoned, the longer the life between grinds and the better the finish on the job. It has also been found that better finishes, closer tolerances, and longer runs can generally be obtained by using standard high speed tools. On some jobs, however, tungsten carbide tools may be desirable.

The nonfree-machining stainless grades will tend to produce long, stringy chips which can be troublesome by piling up on the tool and clogging the work. By using a chip curler, this difficulty is quickly overcome. In addition to controlling long chips, a properly ground chip curler produces a lifting effect on the chip, so that there is less friction on the cutting edge of the tool. Free-machining types do not require as deep a chip breaker or curler as do the non-free-machining types. There are no standard rules or designs regarding chip curlers. The depth of cut and feed governs the width and depth of the chip curler, because the heavier the chip the deeper the curler will have to be to break it. Proper grinding of chip control grooves is as important as grinding the tool.

One of the most widely used machine tools is the engine lathe. It is extremely versatile and will produce an infinite variety of work economically. While it cannot compete with automatic screw machines from the standpoint of speed, it is the dependable work-horse of every shop. With ordinary precaution, problems are seldom encountered in machining stainless on this type of equipment.

Should the lathe have "play" or "looseness", the cutting tool may "ride" the work and glaze or harden the surface. It is recommended that very sharp tools be used and that they be kept cutting continuously throughout each operation. If a chip curler cannot be ground into the tool, it is advisable to have a very steep top rake. Here again, stoning the tools is essential, not only for sharpness but to get smoother finishes and longer tool life.

Parting or cut-off tools of the standard type (either flat blade or circular), are widely used and offer few, if any, problems on any stainless job. These tools are usually supplied with sufficient bevel for side clearance. They must be ground (see Figs. 7 and 8) to provide for top rake and front clearance. Circular cut-off tools are usually employed in automatics on large production screw machine jobs for small diameter work. Top rake is usually the same as for beveled blade cut-off tools. Because cut-off tools are frequently fed into drilled or threaded holes, the circular type will be more rigid and withstand proportionally greater shock than the flat blade type. If the cut-off or parting is deep, causing binding or galling of the tool, it may be necessary to grind 1° to 2° additional side clearance.

Form tools are usually of the dovetail or circular type as shown in Fig. 9. The circular form tool works to best advantage on screw machines, and is therefore preferred by many screw machine operators.

The tool designer can play an important part in the life and efficiency of form tools because the speeds and feeds of form tools are largely governed by the width of the tool in relation to the size and diameter of the bar—plus the amount of overhang and the contour or shape. The circular type, when used for deep forms, must be designed to compensate for lack of side clearance. Frequently, it is advisable to allow side clearance beyond the allowable limits of the finished piece. When this is done, a shave tool will have to be added as another operation, or if extra spindles are not available, incorporate the shaving tool with the cut-off operation. Where close tolerance and fine finish are necessary, it is decidedly advisable to use a shave tool with a light cut at a fast speed. Selection of the tool steel for this operation is important.

Good lubricants and coolants are important in machining stainless and increasing tool life. Finish can also be materially improved by directing the flow of lubricant correctly, and with enough pressure to flush away small chips. Table VIII gives possible causes for troubles arising during turning and their corrections.

Threading: Thread chasers for self-opening die heads are made of high speed steel, and the standard commercial chasers generally have a long and satisfactory life—when they are kept sharp and correctly ground for the materials they are to cut.

Maximum production and smooth finish threads are the two important requirements in thread chasing. To secure best results it is frequently necessary for the operator to adapt his setup to each particular job. If the speed is too slow and an increase of 10 per cent or 20 per cent does not cut down the tool life, this will mean that production can be greatly increased simply by changing speeds. There are times, however, when the job is set up too fast and if such is the case, reducing the speed will prolong tool life, show a gain is production and improve the quality of the work produced. See Table IX for recommended speeds.

The four principal types of chasers used for threading stainless steel are:

1. Most generally used chaser for close tolerance threads is the tangent type, Fig. 10. It is particularly adapt-

NEW LITERATURE

VIBRATION DAMPENER BUSHING
By Manhattan Rubber Division of Raybestos-Manhattan Inc., Passaic, N. J. Bulletin No. 6878 available from Abrasive Wheel Department.

TRANSMISSION BELTING
By B. F. Goodrich Co., Akron. A 4-page illustrated bulletin.

"PRECISE PRODUCTION"
By George Scherr Co. Inc., 200 Lafayette street, New York 12. Publication introduces new gage block utility set. Illustrated.

"PRODUCTION ROAD"
By Twin Disc Clutch Co., Hydraulic Division, Rockford, Ill. Publication illustrates and explains each type of drive in a variety of applications.

AMPCO METAL IN DIES
By Ampco Metal Inc., 1745 South 38th street, Milwaukee 4. A 4-page bulletin—No. 58 describes and illustrates the use of aluminum bronze alloy for die service.

PRE-CAST BEARING BRONZE ON STEEL
By Johnson Bronze, 508 South Mill street, New Castle, Pa. A 4-page illustrated folder.

WATER LEVEL CONTROL
By Northern Equipment Co., Erie, Pa. Descriptive bulletin 451 which tells of controlling water level on boilers which heat a city within a city at Parkchester.

BRAKES FOR CRANES, HOISTS AND MILL MACHINES
By Victor R. Browning & Co. Inc., Mentor avenue, Willoughby (Cleveland), O. An 8-page bulletin describing type "SW" electric brakes.

DRY SEAL GAS HOLDER
By Stacey Brothers Gas Construction Co., Cincinnati 16. A 30-page bulletin D-46 covering detail and engineering data.

PLASTICS FOR LIGHT CONDITIONING
By General Electric Co., Plastics Division, Pittsfield, Mass. A 12-page booklet describing uses of plastics for reflectors and shades.

TOOL CATALOG
By Carboloy Co. Inc., 11155 East 8 Mile road, Detroit. Revised edition—GT-175R.

ALL-METAL RAIL CARS
By The Buda Co., Harvey, Ill. A 16-page booklet describing and illustrating line of cars.

X-RAY AS A FOUNDRY CONTROL TOOL
By North American Philips Co. Inc., 100 East 42nd street, New York. A 4-page booklet No. R1023 describing principles of operation.

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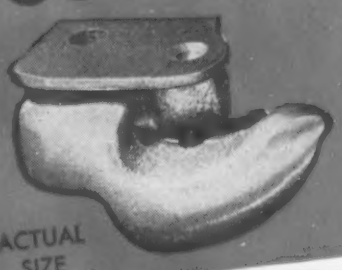

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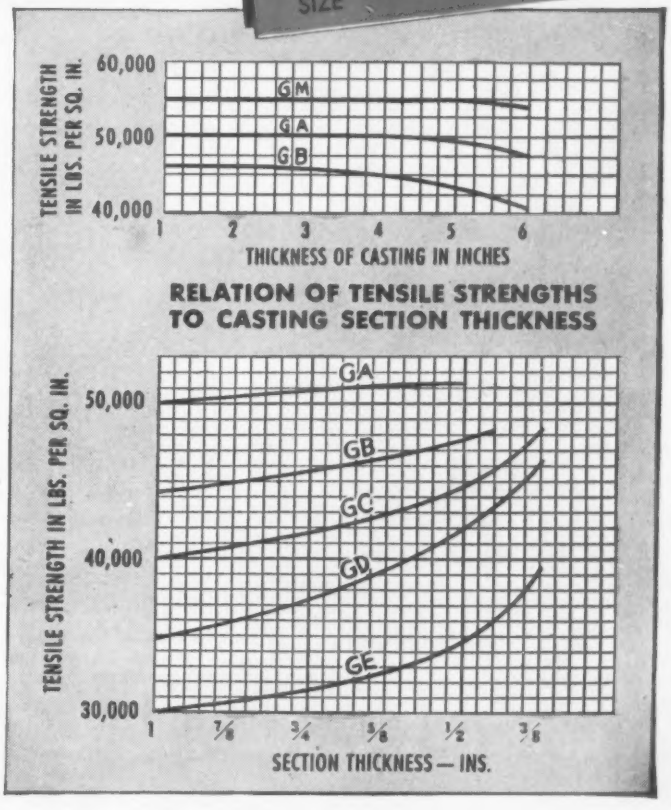

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able for heavy duty jobs such as Acme threads or long coarse threading. The tangent type chaser seems to hold the thread better on heavy-duty work and gives good chaser life between grinds. Wherever possible use a 20° throat. For National Coarse and National Fine threads, where the threads do not run into a shoulder, a 15° throat is desirable. Single Acme threads require a 12° throat angle and double Acme threads a 7° throat angle.

2. The circular type is really the universal thread chaser, as it is adaptable to all types of threads and will work equally well on tubing. This type of chaser, Fig. 11, generally works well with a 25° throat angle.

3. Insert type of chaser is widely used because it produces very good threads and at a low cost. A 20° throat angle is usually recommended for this type of chaser. This type is shown in Fig. 12.

4. The radial type of chaser has been more widely used on ordinary steels. It will produce very smooth threads, inasmuch as this type is ground to follow the shape or contour of the threaded piece. On screw machine jobs, where extremely fine threads are required on stainless parts, this type of chaser has been used successfully. Radial chasers seem to work best on average jobs with a 20° throat angle.

Throat angle or chamfer will vary slightly for each of the chasers described, according to the type of thread being cut and the grade of stainless used. In general, it is advisable to use 1½ to a 3 thread chamfer on the throat. This will usually produce a smooth, fine finish thread—and increase chaser life between grinds.

Advantage of using a long throat angle is that each tooth takes a smaller bite and consequently produces cleaner threads. An examination on one job, for example, shows that a 45° throat angle produced a chip approximately 0.018-in. thick—while a 15° throat angle produced a chip only 0.0065-in. thick.

Where the job calls for threading close to a shoulder and a long throat angle cannot be used, it may be necessary to grind only ½ or 1-thread chamfer on the chaser. If this short throat angle produces a rough thread, a smooth finish can be obtained by running the chaser over the job a second time—or the thread can be cut in two operations by first taking a rough cut and then finishing with a second cut.

Due to the many variables involved in threading stainless, our recommendations for each type of chaser must of necessity be general. For best results, each job should be set up to meet your particular

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requirements. Variables that must be taken into consideration are—

(1) Any one of four types of chasers may be used.
(2) There are many types of stainless—some free-machining and others non-free-machining.
(3) Hardness characteristics may range from soft annealed to a hardness as high as 240 Brinell.
(4) Cutting speeds vary with the type of thread required and the amount of metal to be removed.
(5) Consideration must be given to diameter of thread, pitch of thread, and length of throat on the chamfer being used.

General "rule-of-thumb" recommendation for cutting threads is 18 surface feet per minute. However, regardless of the type of chaser being used, speeds will vary somewhat with the type of thread being cut. Acme threads are usually cut at 12 SFM; American National Coarse threads or tapered pipe threads at 18 SFM; and National Fine threads up to 20 SFM. While these are not the maximum speeds, they are the speeds that usually give longest chaser life per grind.

Where extremely fine threads are required, it might be desirable to drop the speeds down to 5 or 10 surface feet per minute. Also, when cutting fine threads, an advantage will be found in cutting back the heavy sulphurized oil with paraffin oil—generally one part sulphurized oil to five parts paraffin.

The importance of checking cutting oil can not be overemphasized. It should be properly blended or cut back for the particular job on hand. Oil must be kept clean and free of chips. If fine chips float in the oil and get into the chaser, they will ruin the threads. Refer to Table X for the "must" conditions necessary for satisfactory threading.

Milling: The principle of milling is exactly opposite to that of lathe turning or screw machine work. That is, milling machines cut the metal by feeding it into a revolving cutting tool rather than revolving the metal against the tool. Speeds for milling are very nearly equal to those for turning. Roughly, a good starting point for milling stainless is 10 to 15 per cent slower than speeds for the nearest equivalent in ordinary steels. Recommended speeds are shown in Table XI.

Since feed will vary with different types and designs of cutters, it is not practical to make specific recommendations. As a guide—if the cut is too light, the tool will burnish the work and the cut should be increased; if the cut is too heavy, tool life is shortened and

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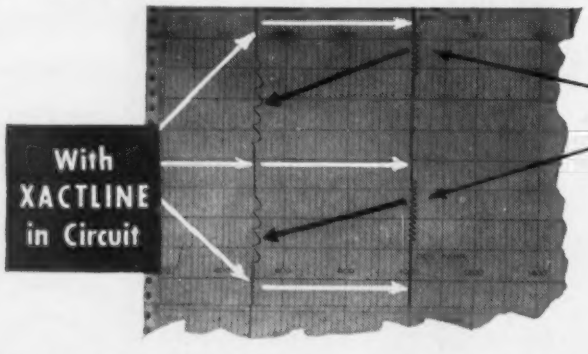

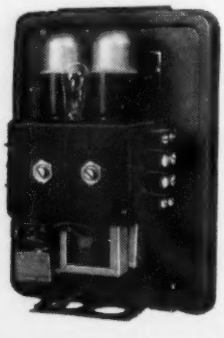

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a lighter cut should be taken. Depth of cut and speed of feed are also regulated by the type of machine tool being used. On the regular milling machines, cuts can usually be increased to the maximum power of the machine.

As a general rule, smoothest finishes are obtained with helical or spiral tooth cutters running at high speed. They cut with a shearing action and as a result cut more freely, and with less chatter than the straight tooth types. And the coarser the teeth, the better. Coarse tooth cutters work under less stress and permit higher speeds than fine tooth cutters. They reduce cutting pressure and the fact that there is more space between the teeth is added help in clearing away the chips.

Heavy cuts must run slower than light cuts since they generate more heat. For example, a roughing cut would be run with heavier feeds and slower speeds than those used for the lighter finishing cuts. But no matter what the operation, both work and tool must be flooded with a good sulphurized base oil properly cut back with paraffin base oil. Milling generates considerable heat which must be carried off by the lubricant or the work will distort and the tool edges will dull or chip rapidly.

Once a milling cut has been started, don't stop unless it is absolutely necessary. The tool will undercut when starting up again. When it is necessary to "back out," go two or three turns behind the work before starting up again. This eliminates the danger of "back lash" and guards against undercutting.

Action of milling cutters is intermittent. Each tooth is starting with a zero chip thickness and ends with maximum cut. Therefore, sufficient clearance behind the cutting edge of every tooth is necessary to avoid a rubbing or burnishing action. "Hogging-in" and excess vibration generally indicate too much rake or not enough clearance and possibly too high a cutting speed. Use short stubby arbors with large diameters wherever possible. Rigidity improves the job.

Fig. 13 shows rake angle, width of land, as well as primary and secondary clearance. This is standard procedure for regrinding milling cutters for stainless steel jobs and gives sufficient clearance and strength. On cutters up to 4 in. diameter, use the maximum clearance shown in sketch, remembering that small cutters take a greater clearance angle than large cutters.

When using plain milling cutters (cylindrical shape), with teeth on outer surface only, it is advisable to go to a helical tooth cutter on mills over ¾-in. wide. Helical teeth cut with a shearing action and not only lessen chatter but

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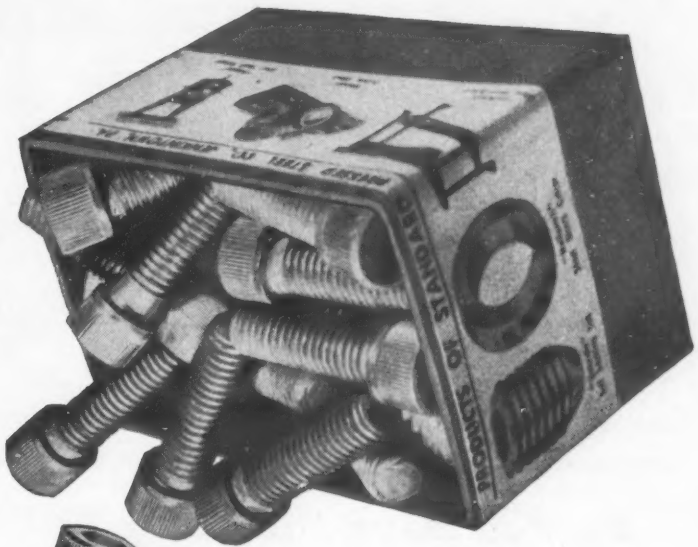

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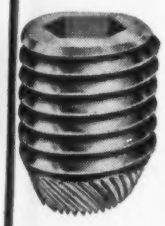

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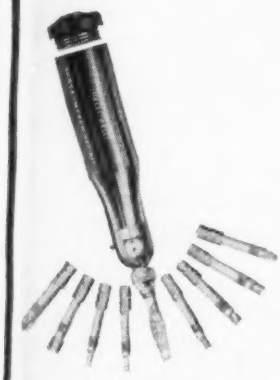

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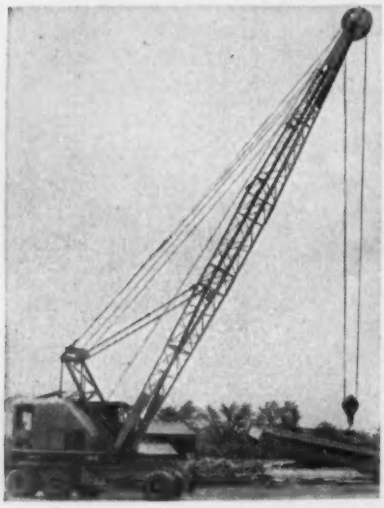

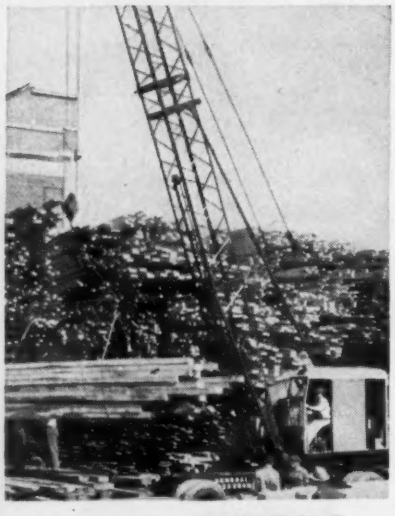

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give a finer finish. Under ¾-in. wide, cutters with straight teeth are satisfactory.

Straddle or side mill cutters have cutting teeth on each side, as well as on the circumference or periphery. Such cutters will mill on both sides of a part or mill shallow slots. For milling shoulders it is common to use half side cutters that have teeth only on one side and on the circumference.

Milling deep slots in stainless steel sometimes presents the problems of chatter, binding and jamming of wide chips. These difficulties can be eliminated by using a staggered tooth cutter. Its alternating teeth cut only one-half of the slot, thereby taking a smaller bite and producing a shorter chip.

For end milling stainless, the solid shank end mill is to be preferred because of its high strength. Angular, gear tooth, convex and concave cutters are being used on stainless by many producers of stainless parts.

Milling is a very satisfactory method for machining stainless steels if these few recommendations are heeded. Faster cuts and better finishes result if a rigid fixture can be securely bolted to the table. Means for locating the piece accurately and the use of an easily operated clamping device are desirable.

Just one final word of caution. In milling one must be a good "housekeeper," because cleanliness is important. A chip or speck of dirt between the spindle and arbor end or between the cutter and the arbor can cause the cutter to run several thousandths out-of-true. Chips or dirt in "T" slots can cause the fixture or clamping blocks to be out of alignment and so force the resulting cut out-of-square. Table XII lists possible milling troubles and their remedies.

(*Continued next week*)

New Welding Code for Construction Offered

Replacing the 1941 (tentative) edition is the 1946 edition of the Standard Code for Arc and Gas Welding in Building Construction, published by American Welding Society. New edition embodies revisions based on experience in recent applications of welding to structural fabrication and on further research investigation.

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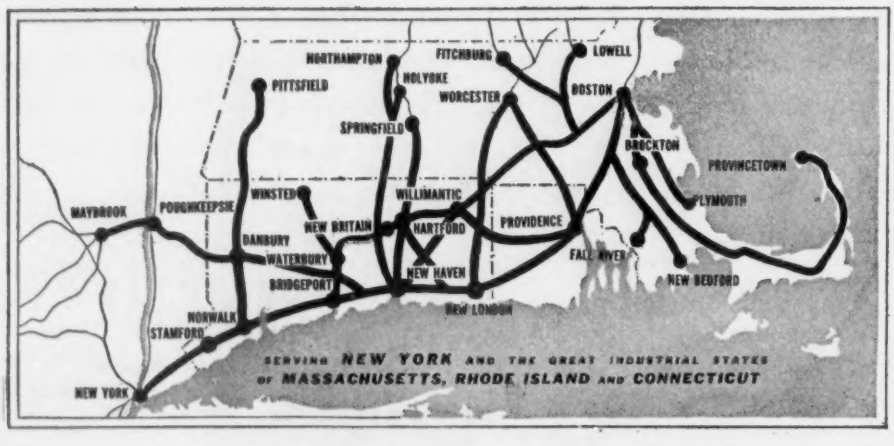

Removing Dissolved Gases

(*Continued from Page* 111)

to give the proper chracteristics to t two types of metal and the end result considerable porosity in both rimm steel and tough pitch copper. In st this can be seen by eye in any cross se tion. The porosity in copper is finel disseminated at the grain boundarie and can be detected only under hig magnification.

Until about two years ago, the prac tical control of dissolved gas in meltin and casting was confined to five gener methods. It should be emphasized tha the methods given below assume goo melting and casting practice and ar used only when it is not possible to elim inate hydrogen pickup by the usual op erating controls.

Freezing the Metal

The first method is to freeze the met —usually as slowly as possible—then melt rapidly and cast. By doing t much of the hydrogen that was origin dissolved in the molten metal escap during solidification. This method h been used on special work before bett methods were known. Recalling aga the hydrogen-temperature solubilit curves, it is obvious that greatest absorp tion takes place at temperatures wel above the melting point. Gas solutio takes finite time, so any extended refin ing at superheat will increase the hy drogen content. This process, then, take advantage of the lower gas content o the solid metal in providing a relatively gas-free charge which is remelted and cast as rapidly as possible to minimize the chance of additional hydrogen pick-up. The obvious disadvantages are its slowness and cost.

The second method of controlling gas is by small alloy additions. Two types of alloys are used: The first is one that will form a stable chemical compound with the dissolved gas so that the gas will be removed as a compound in the slag, or will be finely disseminated as a solid compound in the casting. Unfortunately, a rather active metal must be used to combine with hydrogen, and in many instances, the remaining hydride compound will adversely affect the physical properties of the cast metal. The second type of alloy is one which prevents a chemical reaction from taking place. Alloys of this type are aluminum and silicon for killing steels. They combine with the oxygen and remove it to the slag so that the iron carbide—iron oxide reaction cannot take place. There are numerous copper alloys which give the same effect with copper, (i.e., remove the oxygen from the cuprous oxide). Phosphorous copper is used commercial-

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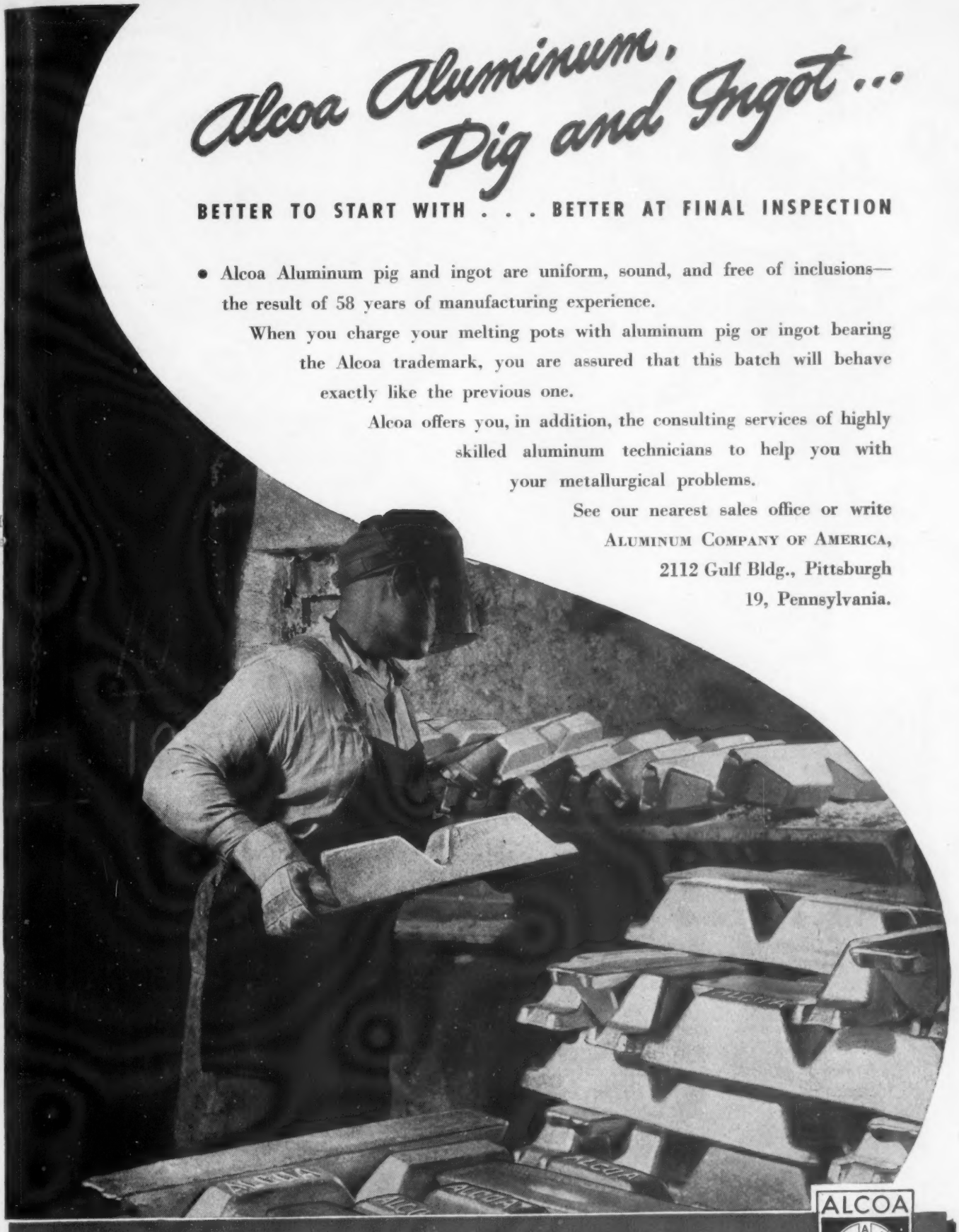

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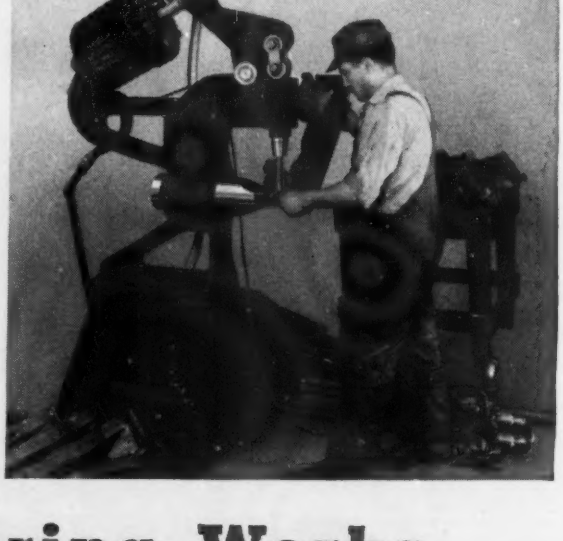

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ly. Lithium, sodium, barium and boron have also been tried. The disadvantage of most such alloy additions is that a small residual is left which affects both the electrical and heat conductivity of the metal.

The third method for removing dissolved gases is by the use of solid fluxes. This method has been used in the aluminum industry, although it is rapidly being supplanted by the flushing process. Briefly, it consists of stirring aluminum chloride into the molten aluminum where it decomposes into aluminum oxide and chlorine gas. It is the evolution of the gas which removes the dissolved hydrogen. Originally, it was thought that a chemical reaction between the chlorine and hydrogen was the basis of this mechanism, but that theory has since been proved false. Solid fluxes are all hygroscopic and it is difficult to maintain them free from water. If flux contains much moisture its use is just as liable to increase porosity as it is to prevent it.

Melting Under Vacuum

Since the solubility of hydrogen in molten metals decreases as the hydrogen pressure over the metal decreases, various systems of melting under vacuum have been evolved. This method requires considerable costly equipment, and is suitable only for melts of relatively small size.

However, another way of reducing the pressure of hydrogen over molten metal is to keep a hydrogen-free gas over the metal all during the refining and casting process . . . . In short: "air condition" the furnace. This method of using a controlled atmosphere requires either a fuel-fired muffle furnace or an electric furnace as well as completely hooded ladles, launders and molds. It has commercial application for producing oxygen-free, high-conductivity copper.

The foregoing methods for insuring sound castings free from hydrogen porosity involve either costly freezing and remelting, expensive or obnoxious fluxes, or specially designed equipment, the expense of which can be justified only when some definite improvement of physical properties is obtained.

(To be continued)

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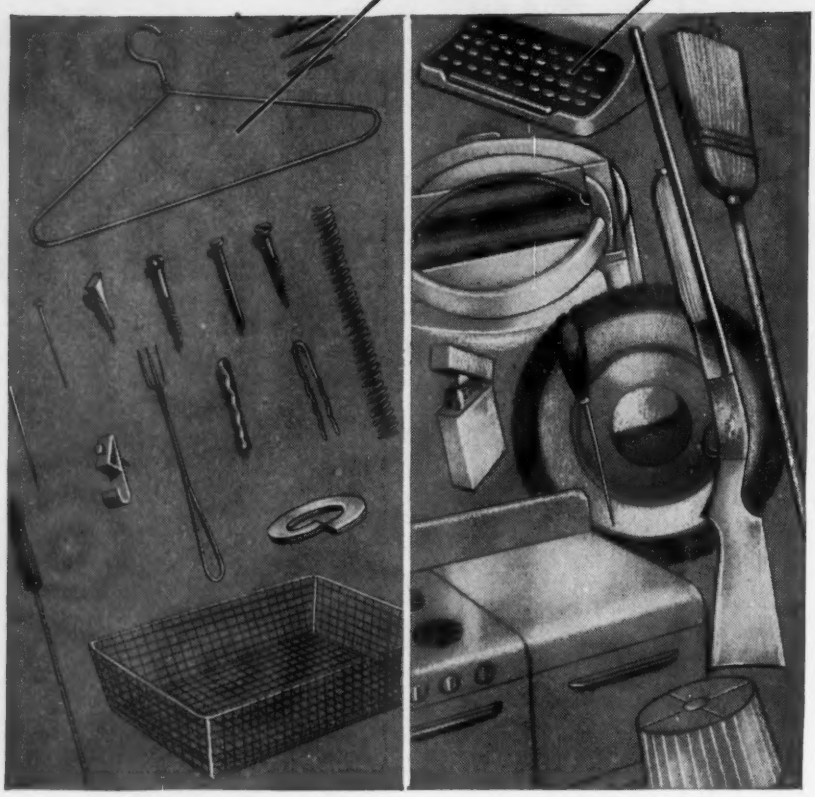

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Brass Die Casting

(*Continued from Page* 114)

pressure of 40 tons. The controls are such that metal injection can only be performed upon full closing of the die. A pressure intensifier, acting during the injection, renders any splash of metal impossible.

A three tie rod arrangement gives full visibility and accessibility of the die set-up, leaving ample space for attaching hydraulic core pullers, which receive their pressure through the automatic valve. The valve performs the injection in two steps: At slow speed in the beginning to bring the metal into the die and with a rapid booster movement of the injection plunger at the end of the injection, thus delivering a powerful squeeze and producing pore-exempt castings.

All brass die casting machines are of the cold chamber type. Metal is ladled into the injector cylinder from which it is immediately forced into the die by a hydraulic ram. In Titan's Polak machines, the injector cylinder is vertical and separate from the die. With this type, there is a slug left in the chamber at the end of injection. This slug is sheared off the sprue by a second ram, spring-actuated and operating from below, before the sprue and gate of castings can be ejected from the die.

Slug Returned to Metal Pot

In this shop, the slug so sheared off is returned by the operator directly to the metal pot from which the charge is ladled. Formerly the slugs were sent, after cooling, to melting furnaces that supply the holding furnaces at the machine. At times, scrapped gates of castings may also be remelted in the holding furnaces.

Supplies of molten metal are brought, usually, from Ajax electric furnaces, in an adjacent melting room, in graphite ladles. This metal is above casting temperature and is allowed to cool to about 1550 or 1500° F in the furnace at the machine. Cooling is effected partly by radiation and partly by adding slugs and scrapped gates of castings. The holding furnaces, however, have resistance type electric heating elements that are under automatic thermostatic control and these make up for any excessive radiation losses. Furnaces are well insulated, preventing heat fatigue of operator. The metal is kept in a holding furnace in semiliquid state for the Polak as well as for the Hydropress machines. For the Lester machine, the metal is kept in fully molten condition.

In the Lester machine, the hydraulic ram is horizontal and the cold chamber is charged from a ladle through a top

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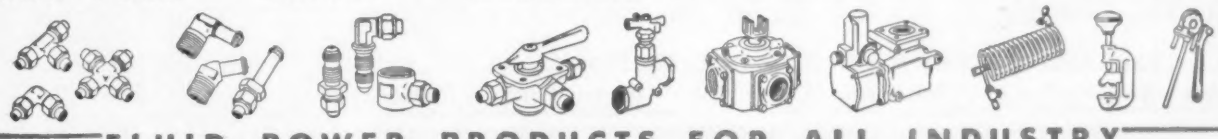

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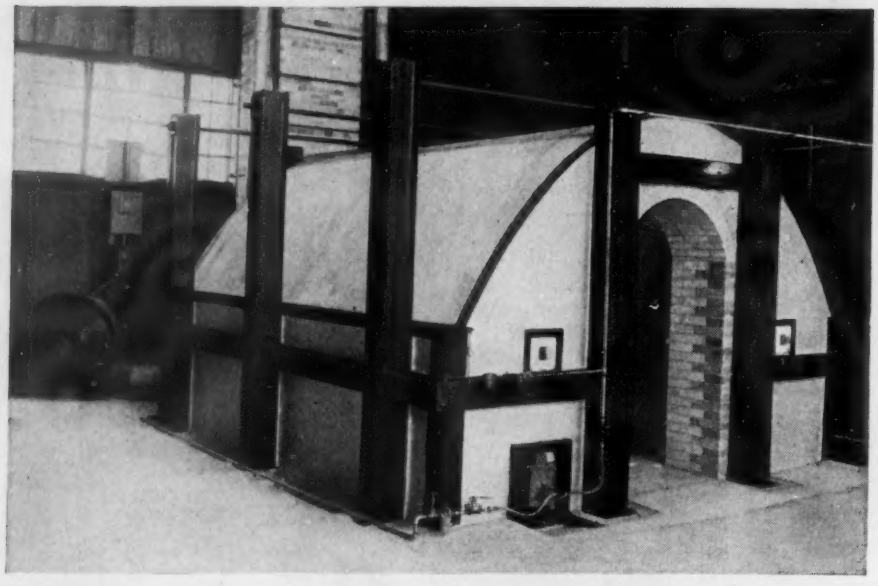

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port. With this arrangement, the injection ram continues into the die and the slug left at the end of its stroke remains on the gate of castings when it is ejected. No slugs or gates of rejects are returned to the holding furnace at the Lester machine but are remelted along with new metal at the supply furnaces.

Two Ajax 900 lb furnaces normally keep all the die casting machines supplied with metal but, when starting cold or when certain machines must be provided with a different alloy than the other machines are using, a separate oil fired furnace is used. A special carriage is used to shift ladles holding about 500 lb of molten metal to machine furnaces. There, the ladle is raised by a hoist and is tilted by hand to fill these furnaces.

Yellow Brass for Castings

Yellow brass is employed for the largest proportion of brass die castings, largely because it costs less than other alloys. Also, it can be made from secondary metal, is easy to machine and polish and has satisfactory properties for many purposes, although not so strong or so high in corrosion resistance as some other alloys listed in the table. Most of the other alloys die cast are special-purpose types.

Although some alloys have tensile strength of 85,000 psi and yield strength up to 65,000 psi, they are harder to machine than yellow brass. Alloys high in nickel also have high corrosion resistance and a yellowish silver color desirable for some purposes. These nickel-silvers, so called, take a high polish that is quite resistant to tarnishing and are light enough in color to be used in place of nickel plated parts. Tombasil has high strength and a lower melting point than most brass die casting alloys. This renders its use somewhat more favorable in respect to die life, but the silicon content introduced to give greater fluidity and flow of the metal, makes machining considerably harder than for yellow brass.

Accompanying illustrations afford a good idea as to the types of brass die castings produced and some show portions of the dies used. Although sections as thin as 0.040-in. or less have been cast when not of too large an area, the preferred minimum thickness is 0.070-in. This is much below the minimum thickness for brass forgings and shapes considerably more complex than can be forged are feasible in die castings.

Cores are often employed and those that are quite long, as well as those that must be placed at odd angles are often feasible, although both types usually increase both initial die cost and die maintenance charges. Cores should have ample draft and, when quite long, are

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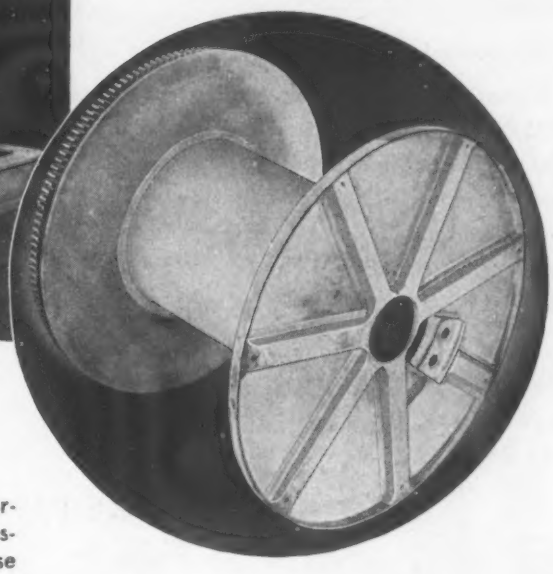

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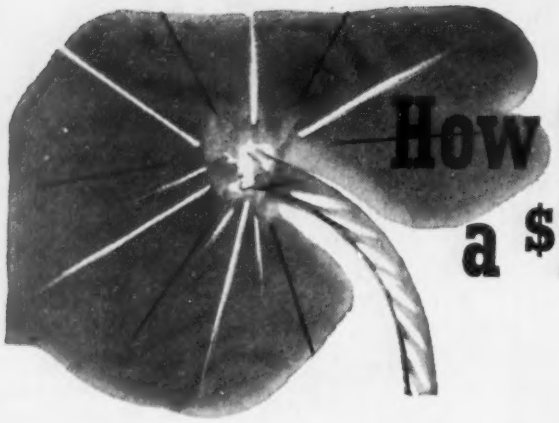

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likely to require some special core pulling attachment which sometimes is operated by air or hydraulic means.

It is feasible to use inserts of steel or of nonferrous materials but they take time to place in the hot die and, to this extent, increase the time of the casting cycle and correspondingly reduce the output per machine. In general, casting rates range from 100 to 200 cycles an hour, once the die is warmed and ready to run, but, for some castings of large size or where delaying factors arise, rates below 100 an hour may result. Where multiple-cavity dies are used, however, the number of castings per hour is correspondingly multiplied.

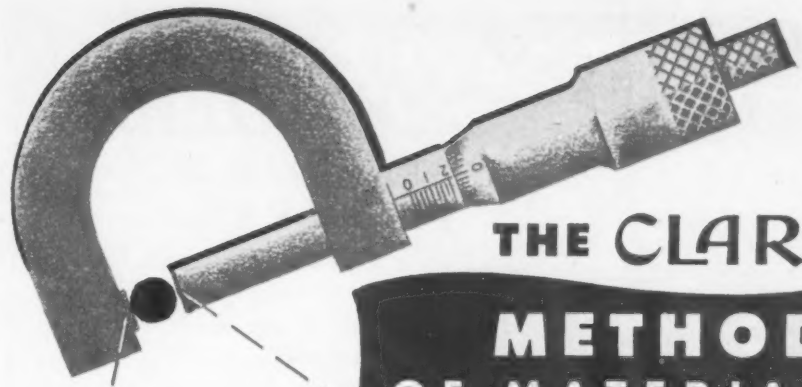
All the Polak machines are equipped with Vickers pumps that deliver a pressure of 2000 psi to a gas loaded accumulator but injection pressures range from about 6000 psi on the smaller Polak machines to about twice this on larger machines. On the Lester machine, the pump applies 1000 psi pressure to the piston operating the injection ram until the resistance encountered counterbalances this pressure. Then the pressure is automatically doubled and pressure of 33,000 psi is applied on the metal as it chills in the die.

High Pressure Applied

This latter arrangement requiring a fairly slow initial injection rate with minimum turbulance provides an opportunity for escape of air gases from the die, results in castings having less porosity. Application of the final high pressure in an instantaneous manner is to insure denser castings by offsetting shrinkage voids and minimizing in volume, any entrapped air or gases present. Both machines produce good castings but no claim for complete freedom from all porosity is made. Where absolute elimination of all porosity is essential, Titan advocates brass forgings rather than castings.

Although a high grade heat-resistant hot-worked die steel is used, most dies show noticeable checking after producing about 5000 castings. Thereafter, checking increases and rougher castings result. The fine cracks in the die surface cause corresponding raised vains or crazing on the castings. These do not adversely affect the strength of the casting but appearance is less satisfactory. In many cases, this is of no consequence, especially on surfaces that are to be machined.

Customers are informed of this tendency toward rougher castings and, when more than 5000 castings are required, are supplied with samples of similar castings to show how surfaces may be expected to appear (if dies are not renewed) after 5000, 10,000 and 15,000 die fillings. This enables the purchaser to determine what, if any, effect continued use of the



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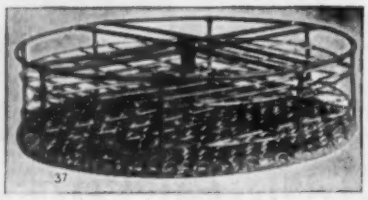

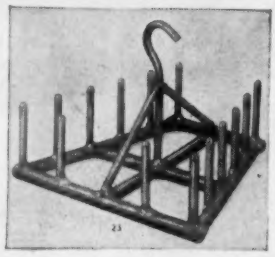

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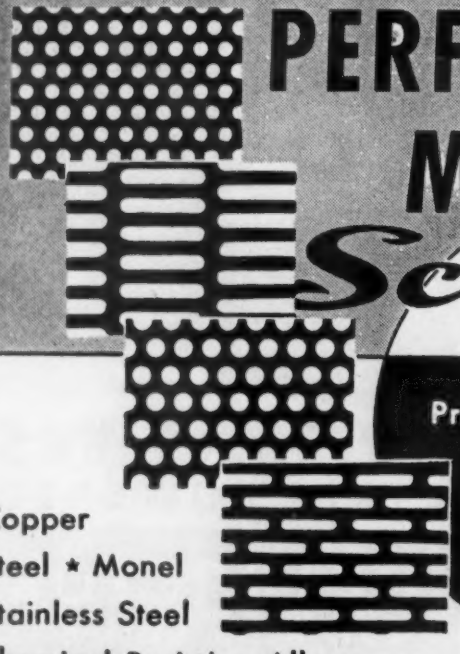

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die may have, on appearance and perhaps on dimensions. The practice avoids misunderstandings and possible rejections, say for dimensional changes, that may occur otherwise.

All dies require somewhat frequent surface redressing to remove the zinc oxide that tends to build up on surfaces. In general, however, heat checks cannot be removed by redressing as they penetrate too deeply into the steel.

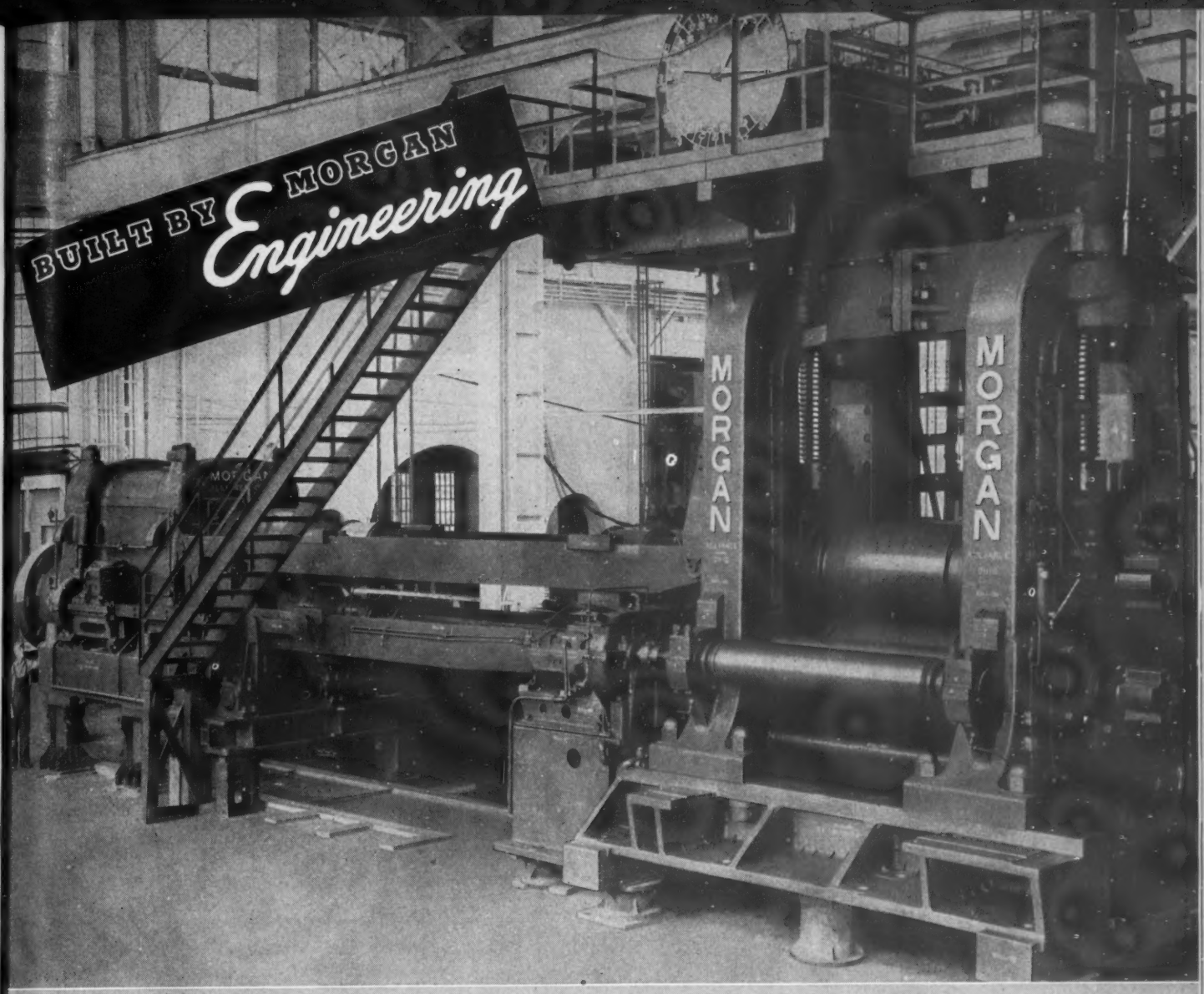
Since core pins come into direct contact with the molten or semimolten brass over most of their entire exposed surface and there is less chance for the heat to be conducted away than from cavity walls, cores often operate continuously at red heat. This results in relatively rapid core deterioration and necessitates somewhat frequent core renewal. The cost of this is estimated and is commonly added to the price per casting. On the other hand, cores save much metal besides helping to keep wall thickness more nearly uniform and reducing machine work on castings, hence cores commonly effect a net saving over the same casting made without coring.

Flash Removed by Shearing Die

As with other types of die castings, flash is produced at die partings, around movable cores and where slides join the die cavity. This flash, or a large part of it, is commonly removed by a shearing or shaving die though in some cases other machining is necessary for removing flash. For machine work other than flash removal or simple drilling or tapping, carbide tools are usually advocated although other tools can be used. A coolant generally is employed in machining.

When specifications call for a bright finish, die castings usually are pickled in concentrated nitric acid and then thoroughly rinsed. If the castings are greasy, cleaning in an orthosilicate solution precedes the pickling. A bright surface, besides improving appearance, also facilitates inspection, as flaws are more easily detected.

In general, brass die castings cost more than those from alloys of lower melting point; first, because the alloys used generally weigh more and cost more per pound; second, because both die and die maintenance costs are higher; and third, because production involves more difficulties and the rates of production are usually lower. Despite these handicaps however, the die casting of brass has grown considerably and, today, the total output of all plants making such castings totals approximately 2000 tons a year. Still further growth is anticipated and is likely to be accelerated greatly when and if steels affording longer die life become available.



MORGAN "36" TWO-HIGH BLOOMING MILL

Above is shown a Morgan 36" Two-High Blooming Mill on erecting floor. Housings are one piece steel castings of the closed top type. Top roll balance is of the counterweight type. Top roll lift sufficient for rolling 42" wide slabs. Manipulator is of the overhead type, compact and accessible. Tables are of heavy design, equipped with anti-friction bearings.

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Strenes METAL
FOR DRAWING AND FORMING DIES

Hot Dip Galvanizing

(*Continued from Page* 137)

sets using Brom Cresol Green for plant control purposes.

In explanation, assume the use of a 16°Be flux wash with a pH of 4.09. If there is no dragover of pickling acid into the flux wash the tendency is for the pH value to become higher, that is, less acid, and it may go above a pH of 5. If, on the other hand, the pH value falls to lower values than that of the new unused flux wash, then it is a safe assumption that pickling acid is being dragged over to contaminate the flux wash and the work being dipped into it. Such a situation should be investigated immediately and be stopped for the sake of quality and economy.

The iron in solution in flux washes of proper pH value seems easy to maintain between 0.10 and 0.3-oz/gal (0.75 and 2.25 g/liter). If, with time, it does increase to values approaching 0.75 oz/gal (5.625 g/liter) a purification may be made by adding ammonium hydroxide to bring the flux wash to a pH of approximately 5.75 and then add hydrogen peroxide slowly to facilitate the precipitation of the iron as a hydrate. Attention to the adequacy of the rinsing after pickling will keep the matter of iron removal as described to a point of minor consideration.

Flux Base Useful

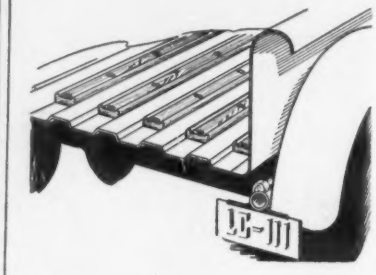
Use of a flux base such as zinc ammonium chloride, to which has been added a suitable frothing agent, serves several useful purposes in a flux wash and on the zinc kettle. Care at this step of the process[6] yields a flux wash composed of zinc ammonium chloride in water which has a reduced surface tension and an increased viscosity. This wash assumes better wetting of the surface of the work, gives a flux film of better protecting characteristics, and is more economical. Since such a film contains some fairly stable colloids, it fuses to a light froth when the work enters the molten zinc. This froth leaves the work quickly and cleanly with the result that less flux is carried over to contaminate the finished work. This condition is especially noticeable on work having more or less inaccessible inner surface, such as pipe.

A zinc ammonium chloride flux wash may be used either hot or cold. Where possible hot flux washes are preferred because excess moisture evaporates rapidly from the flux film on the dipped work and because, under certain circumstances, smoother, more adherent zinc

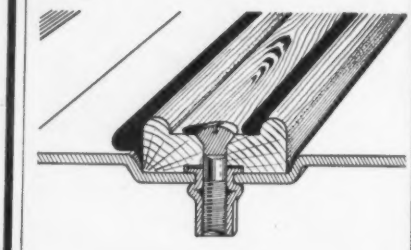
[6] U. S. patents 1,965,759 and 1,965,760, July 10, 1934, A. T. Baldwin, assigned to W. H. Spowers Jr., later assigned to Hanson-Van Winkle-Munning Co.

FASTENING PROBLEM:

Save time and space on assembly line attaching wood floor boards to truck floors. Fastenings must be built to resist rough service without jarring loose. Work must be done from one side only.



SOLUTION:
RIVNUTS
used like this . . .



STEEL B. F. Goodrich Rivnuts were inserted in truck floor holes and upset. Wood floor boards were placed, steel screw attachments entered through holes in boards and screwed into clean threads of the Rivnut. Installation was easily finished by *one* man working from *one* side. Time, space and labor were saved on assembly line. If you have a tough fastening problem, perhaps Rivnuts can solve it. Why not learn the whole interesting Rivnut story?

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RIVNUTS
It's a rivet—It's a nutplate

coatings are formed. Care should be taken to avoid overheating dilute flux washes and too long exposure of the flux treated work in air because these flux films have less rust retarding value. Zinc ammonium chloride flux washes containing 4 lb or more of the salt per gallon of water when heated to the boiling point produce flux films which dry quickly and provide adequate rust retardation.

Many types of work such as castings, pipe, etc., are benefited by allowing them to remain in such hot concentrated flux washes for several minutes, especially if the temperature is 50°C (122°F) or higher. Hydrogen absorbed by the iron or steel in pickling is forced out rapidly in hot flux washes resulting in smoother, more adherent coatings. Temperature of the flux wash and time of immersion have to be adapted to shop conditions.

Uniformity Aids Production

Use of zinc ammonium chloride crystals already mixed with a suitable frothing agent has many advantages over the plain zinc ammonium chloride. Uniformity of the fused flux froth not only aids in production speed but also in the proper fluxing action at all times on all surfaces of the work. A flux froth of the proper height for preheating the entering work, for leaving the entering work quickly and cleanly and for most effective chemical action, is maintained most economically this way. Experience indicates that such flux mixtures are from 15 to 20 per cent more effective than zinc ammonium chloride alone. New fluxes are built in the same manner as with sal ammoniac and additions are made in the same manner as required. Annoyance from fumes is reduced appreciably, thereby affording better working conditions.

The consistency of the fused flux is controlled largely by the frequency of fresh additions of flux crystals. The amount of flux being supplied as the film on the entering work also contributes to this control. The constant supply of an appreciable part of the total flux required in the form of this flux film tends to maintain the fusion in a more active state so that there is no difficulty in maintaining a suitable froth. The only time this condition is not maintained so readily in galvanizing is when the operation is irregular and intermittent; in this event the destructive effect of heat on the idle flux froth causes premature exhaustion. So far no flux has been developed that survives such treatment.

Selection of the proper strength of zinc ammonium chloride flux wash is influenced not only by the type of work being done but also by the handling operation, such as batch sizes and the time of exposure in air. The wash also should be at the highest concentration these fac-

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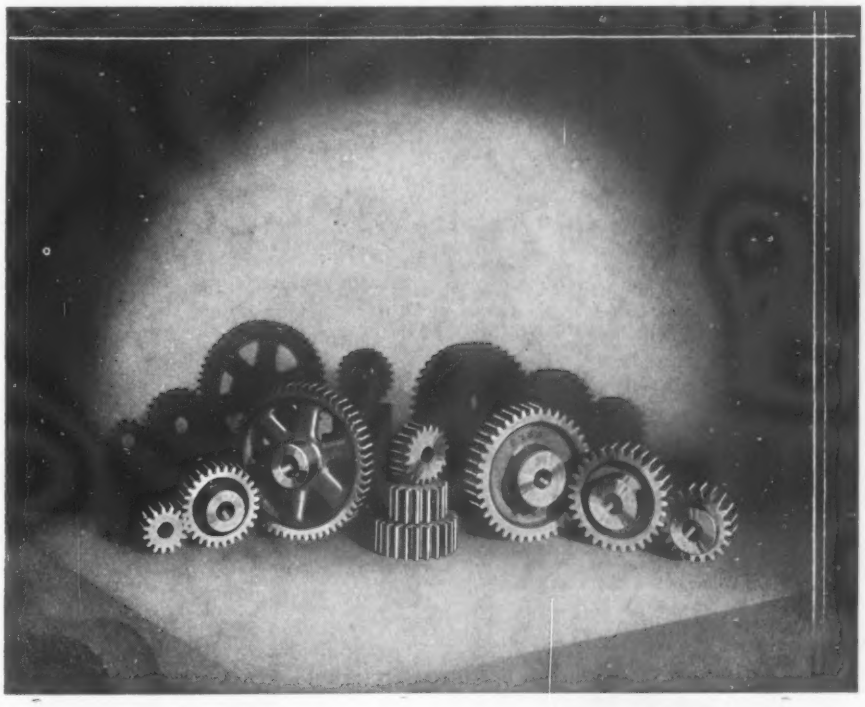

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Green Bay with her progressive business leaders, expanding population and rapidly growing industries has given a big OK to Layne Well Water Systems. With only one minor exception, all water producing equipment for the city bears the famous and always dependable name of Layne. That same foresighted preference which guided city officials was also true with her industries—Warehouse and Cold Storage Plants, Paper Mills, Public Service Companies, Breweries, Creameries, Milk Plants, Laundries, Soap Manufacturers, Food Processing Plants, Religious Charities, County Institutions, and many others.

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Layne high efficiency Well Water Systems are precision built to very rigid standards of excellence. They embody the finest engineering features yet developed. For further convincing facts about Layne Well Water Systems and Layne high efficiency Vertical Turbine Pumps, write for literature. Layne & Bowler, Inc., General Offices, Memphis 8, Tenn.

HIGHEST EFFICIENCY

Layne Vertical Turbine pumps are available in sizes to produce from 40 to 16,000 gallons of water per minute. High efficiency saves hundreds of dollars on power cost per year.

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LAYNE

WELL WATER SYSTEMS VERTICAL TURBINE PUMPS

tors will permit in order to allow the flux film to supply the largest proportion possible of the total flux requirements. This leads to economy in flux use. The actions of the men at the kettles are difficult to control; the natural tendency of the operators seems to be wasteful in the use of flux crystals. Detail differences in galvanizing the same products in different plants lead to rather wide differences in the strength of flux wash required and the total flux used.

Broadly speaking, wire calls for flux washes from 5 to 12°Be either hot or cold; fabricated wire products about 15 degrees; castings and fittings, 10 to 15 degrees; drums, barrels and boilers, 12 to 17 degrees; sheets, 10 to 15 degrees; pipe, 18 to 22 degrees; and, heavy castings and tanks, 20 to 25°Be. These figures are for hydrometer readings at room temperatures. As previously indicated, whether or not the zinc ammonium chloride flux wash must be heated depends on local conditions; it may be heated up to 212° F without loss of anything except water.

Some few operations are carried out most satisfactorily by heating the work *after* it leaves the flux wash and this, if done in closed ovens away from the air, may be carried out safely to temperatures above the fusion point of the flux. The flux film on the entering work may provide all the flux required or as little as 25 per cent of the total depending on the product and how it is handled.

Advantages of Zinc Ammonium Chloride

Generally speaking, the total amount of a zinc ammonium chloride flux used seldom exceeds the amount of sal ammoniac used for the same work by the hydrochloric acid-sal ammoniac system. When galvanizers change from the old method to zinc ammonium chloride, experience leads to use of a smaller amount of zinc ammonium chloride flux.

Products galvanized with the use of a zinc ammonium chloride flux carried out with the due regard for the important operating features have smooth, adherent, ductile zinc coats. Products galvanized this way form more readily, with little or no cracking of the coats. While a rather severe test, exposure to a sand blast of products galvanized this way shows a pounding and flattening effect rather than the typical shattering of coats put on by the use of hydrochloric acid and sal ammoniac. Tempered steel is readily galvanized by the zinc ammonium chloride flux method without loss of temper. The replacement of the hydrochloric acid-sal ammoniac method by a zinc ammonium chloride flux wash and kettle flux does not require expensive additional equipment.

The galvanizer's choice of a flux and fluxing system will be influenced largely by the extent of his desire to produce high-quality work at a minimum cost. The direction galvanizing must follow to accomplish this and the use of a properly prepared zinc ammonium chloride flux wash and kettle flux have been discussed in the foregoing text. While to many with long experience in galvanizing, these suggestions may seem of doubtful practicability, in fact, they are all now well tried and proved and are giving satisfactory results.

The change required in most shops to take advantage of the merits of zinc ammonium chloride is more of the nature of a change of point of view of the operator than of extensive and expensive changes in equipment and operating details. Modern demands for quality in galvanizing have moved so far forward that the old method of finishing the pickling in the fused flux itself is no longer adequate.

(*To be continued*)

Paper Covers Incentives on Repair Welding Castings

Analysis and practical solution of problems encountered in trying to determine a fair incentive for repair welding steel castings is the subject of a short paper published recently by Harnischfeger Corp., Milwaukee.

According to the paper, three variables which must first be ascertained are: (1) Arc minutes, (2) number of castings welded, (3) weight of castings. While the second and third variables are relatively easy to ascertain the first can be measured and recorded accurately by Harnischfeger's electric arc timer. The accumulated arc time for one welding operator for one shift is obtained by individual readings of each clock. A centralized recording system can be used for mass production welding control.

The arc timer is designed to register only when the machine is welding. It does not register when machine is idling or when there is a short circuit condition such as laying holder on work. System works on two distinctly different hook-ups; one involves a current and voltage relay while the other uses two voltage relays.

Ball Bushing Booklet

Operating principles and features are explained and 20 advantages obtained are listed in the booklet on ball bushings for linear motions recently issued by Thomson Industries Inc., Long Island City, N. Y. Listed are 17 sizes ranging from a ¼-in. shaft to one of 4 in. Standard dimensions, installation data and load ratings are covered along with special designs and fields of applications.

Peak Voltmeter to Study Amplitude Stability

A suppressed-range type recording peak voltmeter designed to study the short and long time amplitude stability of a 1000-cycle power supply was recently developed by Philips Laboratories Inc., Irvington-on-Hudson, N. Y.

Minimum detectable voltage change is 10^{-3}volt, so that with an input of 10 v rms average amplitude fluctuations of 0.01 per cent can be recorded.

Voltmeter compares positive peaks of alternating voltage to be studied, with a series of dry cells used as reference voltage. Comparison is made by applying reference voltage along with alternating voltage to grid of vacuum tube. Tube is biased past cut-off by reference voltage; plate current flows only when positive peaks of alternating voltage exceed reference voltage.

Sound Slide Film Covers Controller Problems

A 35 mm sound slide film showing methods of handling pressure and temperature control problems may be obtained from Leslie Co., Lyndhurst, N. J. Following the steam system of an industrial plant from the high pressure steam at the boiler through the power generating equipment, processing machinery, boiler auxiliaries, heating and low pressure steam systems, the 20 min film covers applications and installations of a variety of regulators and controllers.

According to the company, the film analyzes which type of regulator is best for a given purpose after reviewing general applications.

Legal Aspects of Contracts In Construction Industry

Legal Phases of Construction Contracts, by I. Vernon Werbin; simulated leather, 267 pages, 5¼ x 8¼ inches; published by McGraw-Hill Book Co. Inc., New York, for $2.75.

Both legal and engineering problems arise in construction contracts, the latter being easily solved by the experienced contractor, engineer or architect, while the former present much difficulty. This volume treats the matter practically so that it will be understood readily by contractors, owners, engineers and architects, as well as by technically trained attorneys. The text is based on actual cases decided by courts. The material facts and contract provisions are set forth, as well as quotations from the court's opinions so that the reader is given a general understanding of the fundamental principles of law involved in the decisions.

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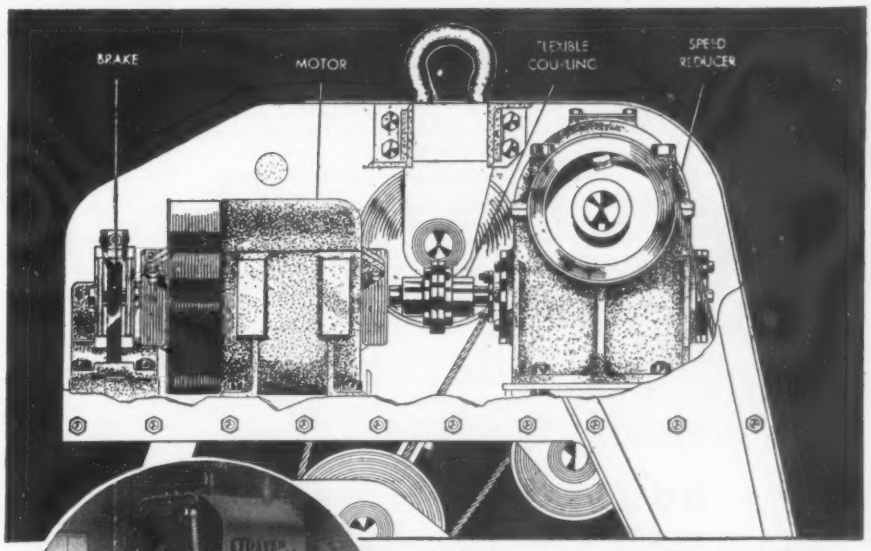

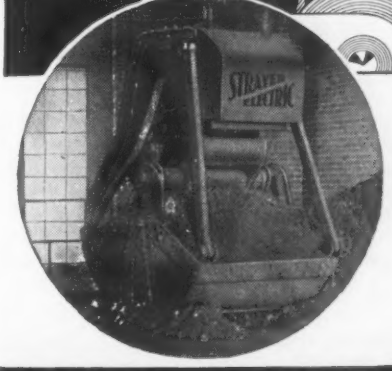

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The Business Trend

Gain Registered in Rate Of Industrial Production

INCREASED OUTPUT of automobiles pushed STEEL's industrial production index up 2 points in the week ended Sept. 28, making the index register 153 per cent (preliminary) of the 1936-1939 average of 100.

Little change occurred in the rates of steel ingot production, electric power output, and railroad car loadings, all of them continuing at high levels.

At 153 per cent, STEEL's index is only 1 point below the postwar record of 154 per cent set in the week ended Sept. 14.

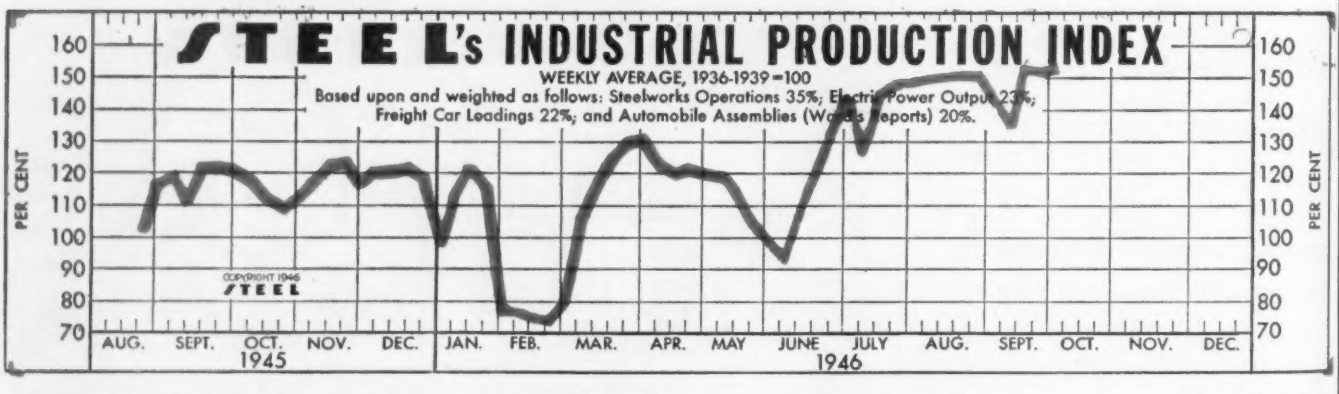
CAR LOADINGS—Freight car loadings in the fourth quarter of 1946 are expected to be 9.8 per cent above those in the corresponding period of 1945, according to the Association of American Railroads. This increase would put loadings at 7,599,575 cars for the quarter, compared with 6,924,123 actual car loadings in the corresponding period of last year. Among commodities expected to show increases are: Iron and steel, 3.3 per cent; other metals, 3 per cent; automobiles and trucks, 138.5 per cent; agricultural implements and vehicles other than automobiles, 45.1 per cent; machinery and boilers, 11.2 per cent; and coal and coke 15.1 per cent.

NEW BUSINESSES—Volume of new businesses incorporated in July slightly exceeded that for June, a 47-state tabulation by Dun & Bradstreet Inc. shows. Totaling 11,867 (partly estimated), the July figure increased by 573, or 5.1 per cent over the June incorporations, and exceeded by 7694 the number of charters issued in July, 1945. During the first seven months of 1946, 82,836 stock company formations were recorded, representing a monthly average of 11,834. This substantially exceeded the average of 5963 per month during the last six months of 1945.

COAL—Production of bituminous coal declined in the week ended Sept. 21, compared with the preceding week, but at 12,330,000 tons still was at a high level. This continued high rate of output helped raise the 1946 production to within 51,230,000 tons, or 12 per cent, of the production in the corresponding period of last year.

PRICES—Wholesale prices advanced 1.7 per cent during the week ended Sept. 21 following the declines of the previous three weeks, the U. S. Bureau of Labor Statistics reported. There were increases in most major commodity groups. The Bureau's index for the week ended Sept. 21 registered 123.8 per cent of the 1926 average of 100. The latest index figure is 3.6 per cent below the peak level of four weeks ago.

MANPOWER—Continued increases in demand for manpower are expected in more than three-fourths of the 94 important labor market areas surveyed by the U. S. Employment Service. While manpower shortages still are severe in many sections of the country they are most acute in the building and metalworking industries. The agencies said increases in nonagricultural employment were reported in 72 per cent of the 94 areas early in September.



The Index (see chart above): Latest Week (preliminary) 153 Previous Week 151 Month Ago 149

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)†	90.5	90	90	8
Electric Power Distributed (million kilowatt hours)	4,518	4,507	4,404	4,0
Bituminous Coal Production (daily av.—1000 tons)	2,055	2,115	2,036	1,9
Petroleum Production (daily av.—1000 bbls.)	4,777	4,775	4,833	4,3
Construction Volume (ENR—Unit $1,000,000)	$84.1	$116.8	$79.9	$8
Automobile and Truck Output (Ward's—number units)	85,572	80,972	74,960	10,4

* Dates on request. † 1946 weekly capacity is 1,762,381 net tons. 1945 weekly capacity was 1,831,636 net tons.

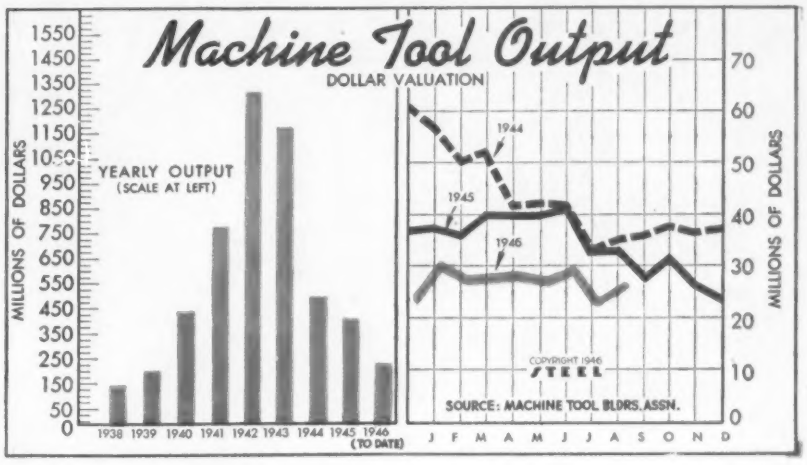
TRADE				
Freight Carloadings (unit—1000 cars)	900†	899	908	8
Business Failures (Dun & Bradstreet, number)	28	19	28	
Money in Circulation (in millions of dollars)‡	$28,448	$28,453	$28,376	$27,7
Department Store Sales (change from like wk. a yr. ago)‡	+26%	+37%	+40%	+1

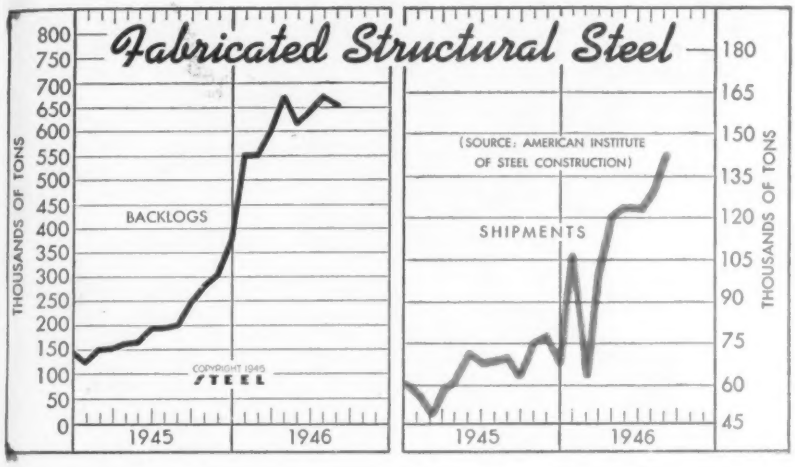
† Preliminary. ‡ Federal Reserve Board.

Machine Tool Shipments

(000 omitted)

	1946	1945	1944	1943
Jan.	$30 263	$37,353	$56.363	$117,384
Feb.	26.949	36 018	50 138	114.594
Mar.	27,326	40.045	51,907	125,445
Apr.	28.108	40.170	41.370	118.024
May	26.580	39.825	41.819	113.859
June	28.580	41.040	41.471	108.736
July	22.360	32.504	32.753	97.541
Aug.	26,850	32.500	35.177	87.805
Sept.	.....	27.300	35.889	85.842
Oct.	.....	31.200	37,516	78.302
Nov.	.....	26.000	36.277	71,811
Dec.	.....	23,200	36,784	60,873
Total	.....	$407,155	$497,464	$1,180,216





Fabricated Structural Steel

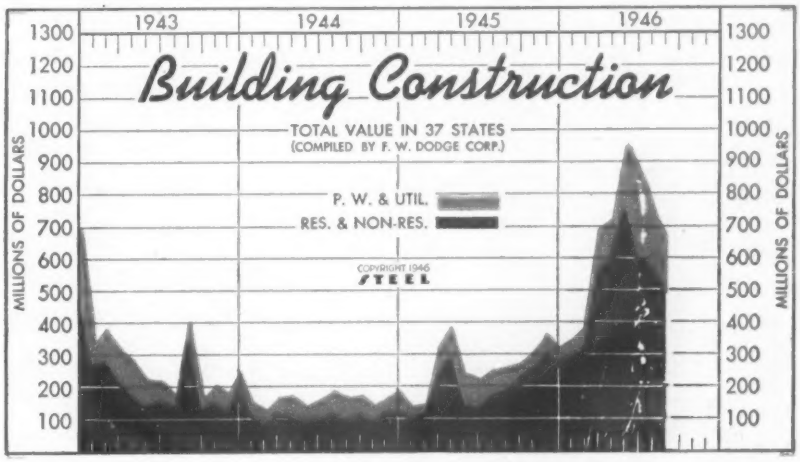
(000 Tons)

	Shipments			Backlogs		
	1946	1945	1944	1946	1945	1944
Jan.	107.5	57.0	35.2	552	124.4	113.1
Feb.	63.8	49.0	42.9	551	151.6	117.6
Mar.	102.8	59.5	41.4	605	133.3	106.3
Apr.	122.5	62.8	44.5	674	162.5	111.2
May	124.4	72.6	50 7	615	165.7	116.3
June	126.8	69 2	43.0	642	195 2	122.7
July	132.0	69.9	45.3	674	191.0	125.4
Aug.	145.1	70.6	55.2	651	201.1	130.4
Sept.	....	63.4	57.5	...	248.3	151.1
Oct.	....	76 6	61.6	...	282.8	174.4
Nov.	....	78.0	59.4	...	304.9	184.2
Dec.	....	68.8	61.3	...	375.2	142.5
Total	....	797.4	597.9	...	....	....

Construction Valuation in 37 States

(Unit—$1,000,000)

	Total	Public Works-Utilities		Residential and Non-Residential	
	1946	1946	1945	1946	1945
Jan.	357.5	50.2	39.8	307.3	101.2
Feb.	387.4	61.7	32 0	322.7	115.0
Mar.	697 6	143.6	90.6	551.0	238.3
Apr.	734.9	128.1	111.9	606.8	283.9
May	952.4	197.9	107.9	754.6	134.6
June	807.9	202.5	95.0	603.5	132.3
July	718.0	153.1	89.9	564.9	167.8
Aug.	679.9	184.4	77.5	495.6	186.1
Sept.	....	....	54.6	....	223.6
Oct.	....	....	61.1	....	255.5
Nov.	....	....	74 0	....	296 0
Dec.	....	....	51.0	....	279.7
Total	....	....	885.3	....	2,414.0



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$12.425	$14,061	$11,074	$11,553
Federal Gross Debt (billions)	$265.6	$265.5	$267.8	$262.5
Bond Volume, NYSE (millions)	$35.4	$38.8	$20.7	$33.1
Stocks Sales, NYSE (thousands)	8,422	10,688	6,875	6,505
Loans and Investments (billions)†	$59.4	$59.2	$60.0	$61.6
United States Gov't. Obligations Held (millions)†	$40,525	$40,595	$41,571	$45,473

† Member banks, Federal Reserve System.

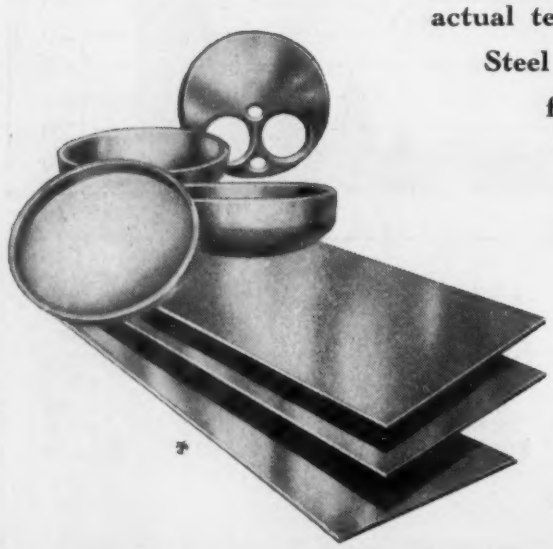
PRICES

STEEL's composite finished steel price average	$64.45	$64.45	$64.45	$58.27
All Commodities†	123.8	121.7	128.4	104.9
Industrial Raw Materials†	142.5	138.4	144.9	115.5
Manufactured Products†	117.1	115.9	123.6	101.8

† Bureau of Labor Statistics Index, 1926 = 100.

Some things *can't* be concealed

A fighting spirit . . . constantly warring against imperfections . . . has been an important contribution to Worth success. Even though this effort may seem strenuous at times, the final, telling results are satisfying, because Worth steel has the qualities that count, when a product is put to actual test . . . uniformity, quality and finished excellence. Steel Plate up to 150″ wide; Flanged and Dished Heads from 9-1/2″ to 216″ O.D.; in thickness from 3/16″ to 4″.



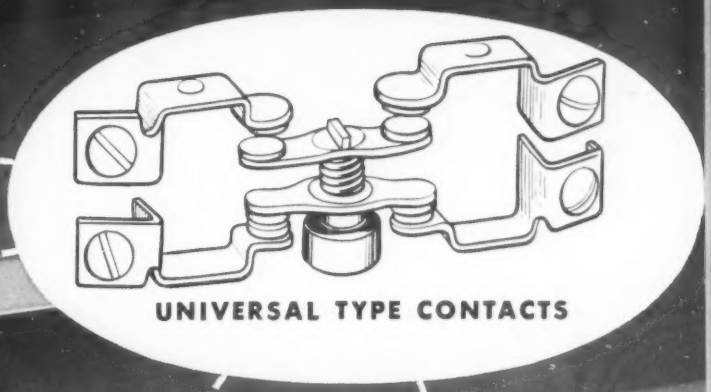
WORTH

STEEL PLATE • FLANGED & DISHED HEADS

WORTH STEEL COMPANY · Claymont, Delaware

Here are 4 Relays that Equal 18

. . . they will satisfy any industrial requirement



UNIVERSAL TYPE CONTACTS

TWO-POLE UNIVERSAL RELAY

FOUR-POLE UNIVERSAL RELAY

SIX-POLE UNIVERSAL RELAY

EIGHT-POLE UNIVERSAL RELAY

You can provide for unexpected design or circuit changes with the new Bulletin 700 Universal Solenoid Relays. These relays are a new idea in relay design—an amazingly simple one. To change from "normally open" to "normally closed" contacts—or vice versa—you merely change the contact connections. A most convenient arrangement for experimental work or tricky control circuits. These relays have the same time-proven construction as all other Bulletin 700 Solenoid Relays. Available in 2, 4, 6, and 8-pole construction. Also furnished as a Bulletin 200 direct current "Universal" relay. Write for information.

A-B Quality

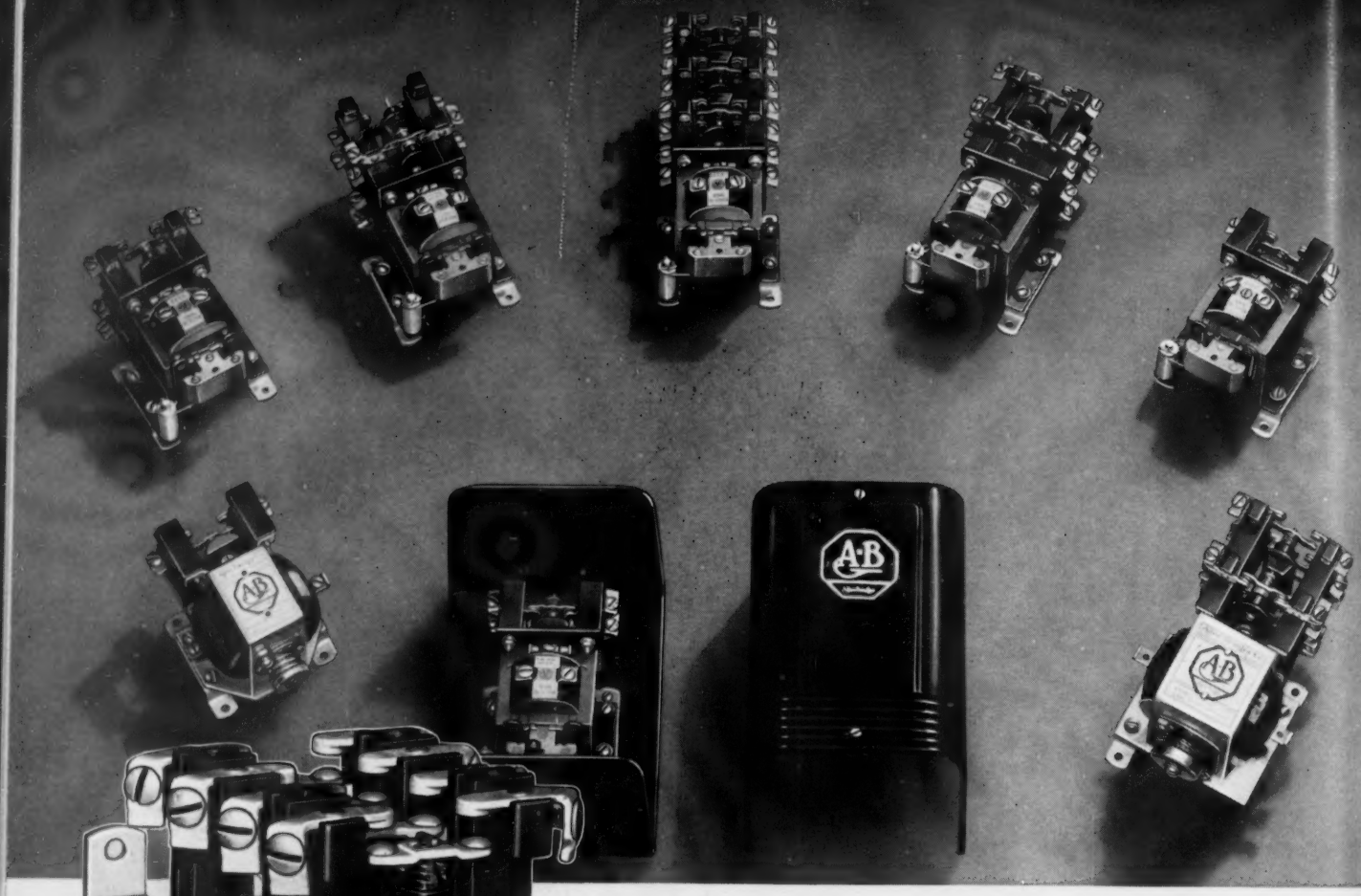
BULLETIN 700 (A. C.)
BULLETIN 200 (D. C.)

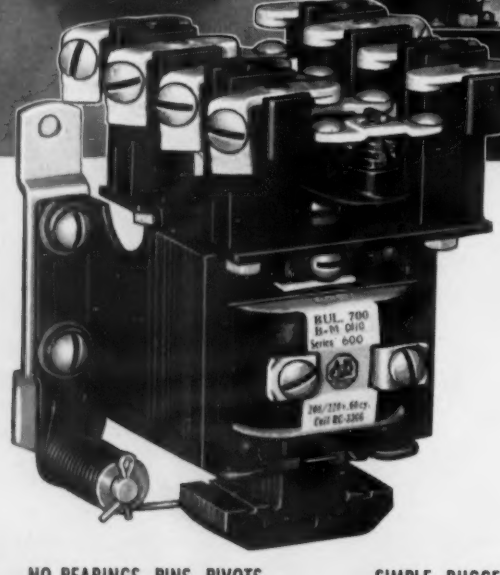
ALLEN-BRADLEY

UNIVERSAL SOLENOID RELAYS

QUALITY

Good for MILLIONS of Operations





Bulletin 700 (A.C.) ★ Bulletin 200 (D.C.)

SOLENOID RELAYS

Here is a line of small, solenoid-operated relays for industrial applications that require unfailing dependability. Can be furnished in single and multiple pole construction, up to and including 12-pole units. Available in the open type, or in the NEMA Type 1, Type 4, and Type 7 enclosures.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

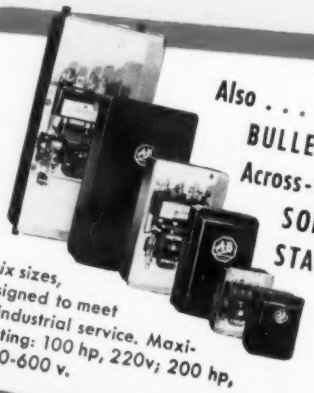
NO BEARINGS, PINS, PIVOTS
The only moving part is the solenoid plunger. There are no parts to gum up or corrode and cause trouble.

NO CONTACT MAINTENANCE
Double break, patented cadmium silver alloy contacts never require any cleaning, filing, or dressing.

SIMPLE, RUGGED DESIGN
Bulletin 700 relays are ruggedly built to withstand millions of operations on the heaviest industrial service.

EASY TO WIRE
All terminals are conveniently accessible and plainly marked. Enclosures provide generous space for wiring.

A-B Quality



Also . . . BULLETIN 709 Across-the-Line SOLENOID STARTERS

Now six sizes, all designed to meet every industrial service. Maximum rating: 100 hp, 220v; 200 hp, 440-550-600 v.

ALLEN-BRADLEY
SOLENOID MOTOR CONTROL
QUALITY

Mills Enter Last Quarter With Order Books Bulging

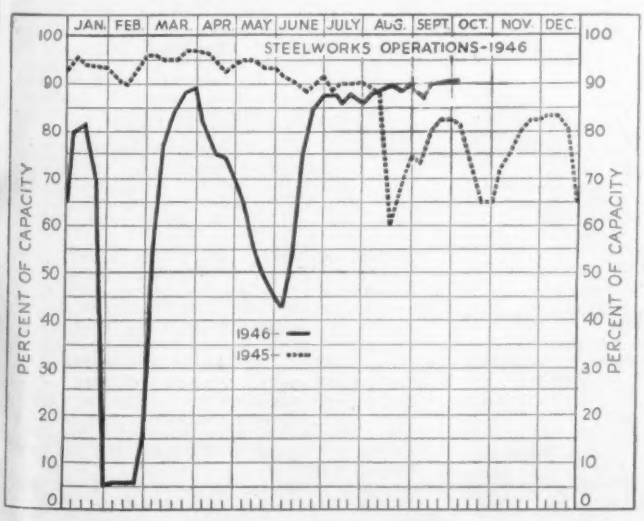
Uncertain extent of preferred tonnage makes scheduling difficult . . . Production held high in spite of raw material shortages

STEEL producers are making some headway on their arrearages, as compared with three months ago but as they enter the final quarter they still have a substantial volume of tonnage on order promised for delivery by this time, but unshipped. What further progress can be made in the remaining three months of this year depends in no small measure on ability to maintain a high rate of production and, as applied especially to sheets and strip upon their burden of rated orders.

Shortages of scrap, pig iron and coke remain a threat to high production, with an unstable and generally unsatisfactory labor situation, with manpower difficulties outside as well as inside the steel industry leaving their mark. However, despite these handicaps steel operations are hovering about a peacetime peak, still not as high as they could go, and it is possible they may at least be maintained.

The full extent of rated tonnage should be fairly accurately gaged soon, but at the moment sellers of some products still are not able to estimate this volume and this, with the uncertain outlook with respect to fourth quarter production, is causing delay in various quarters in opening of books for first quarter of next year. There is little doubt, however, that when action is taken it will be found that capacity in that period in some products will be well absorbed, because of heavy carryovers and other miscellaneous commitments.

This should be particularly the case in sheets, hot strip and smaller sizes of hot carbon bars, such as are rolled on eight and ten-inch mills, and in light shapes. On some other products, such as plates, boiler and mechanical tubing and rail accessories, books of some producers already are far extended into next year, not only because of arrearages almost certain to carry over, but also because of orders they have been accepting freely from regular customers. With books now opened by some producers on cold-drawn carbon bars, hot and cold alloy bars, stainless sheets and cold narrow strip first quarter capacity on these items should be fairly well absorbed by the end of the year. Hot alloy bars may be an exception, as they have been lagging behind most other products, shipments now being possible for November.



DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Oct. 5	Change	Same Week 1945	Same Week 1944
Pittsburgh	98	+ 2	74.5	92
Chicago	91	+ 0.5	91.5	99.5
Eastern Pa.	81	None	76	93.5
Youngstown	90	None	76	87
Wheeling	86	— 7.5	88	92
Cleveland	91	None	82	92.5
Buffalo	90.5	None	86	86
Birmingham	99	None	95	95
New England	92	— 3	82	89
Cincinnati	78	— 6	77	87
St. Louis	72.5	None	68	75
Detroit	84	+ 3	84	89
Estimated national rate	90.5	None	82	95.5

Based on weekly steelmaking capacity of 1,762,381 net tons for 1946; 1,831,636 tons for 1945; 1,791,287 tons for 1944.

Decontrol of steel prices is reported under discussion by OPA. While the whole range of products is being considered there is little likelihood of decontrol being effected soon on such tight supply items as sheets and strip. Meanwhile, the steel industry has not yet formally filed with OPA a request for an increase in ceiling prices. Delivered prices on steel products at various points have been increased as the result of a ruling of OPA permitting passing on to consumers of higher freight rates which went into effect last July.

With the opening of fourth quarter the emergency priority CC rating has been reinstated. This was suspended last January when the steel strike broke out. Producers have been accepting these rated orders for fourth quarter delivery for some weeks. They are especially heavy in cold-rolled sheets and strip, galvanized and enameling sheets.

Steelworks operations last week maintained the rate of the preceding week, 90½ per cent of capacity, changes in schedules being few and small. Chicago gained ½-point to 91 per cent, Pittsburgh 2 points to 98 from a revised rate of 96 for the prior week and Detroit 3 points to 84 per cent. Wheeling lost 7½ points to 86, Cincinnati 6 points to 78 and New England 3 points to 92. Other rates were unchanged, as follows: St. Louis 72½, Youngstown 90, Birmingham 99, Buffalo 90½, Cleveland 91, eastern Pennsylvania 81 and West Coast 84.

Scrap supply continues low in spite of government assurance that prices will not be advanced, little tonnage coming out. Some improvement has been seen in cast scrap on which a price advance was granted.

COMPOSITE MARKET AVERAGES

	Oct. 5	Sept. 28	Sept. 21	One Month Ago Sept., 1946	Three Months Ago July, 1946	One Year Ago Oct., 1945	Five Years Ago Oct., 1941
Finished Steel	$64.45	$64.45	$64.45	$64.45	$64.45	$58.27	$56.73
Semifinished Steel	40.60	40.60	40.60	40.60	40.60	37.80	36.00
Steelmaking Pig Iron	27.50	27.50	27.50	27.50	27.50	24.19	23.00
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	19.17

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished material (except tin plate) and wire rods, cents per lb; coke, dollars per net ton; others, dollars per gross ton.

Finished Material

	Oct. 5, 1946	Sept., 1946	July, 1946	Oct., 1945
Steel bars, Pittsburgh	2.50c	2.50c	2.50c	2.25c
Steel bars, Philadelphia	2.86	2.86	2.86	2.57
Steel bars, Chicago	2.50	2.50	2.50	2.25
Shapes, Pittsburgh	2.35	2.35	2.35	2.10
Shapes, Philadelphia	2.48	2.48	2.48	2.215
Shapes, Chicago	2.35	2.35	2.35	2.10
Plates, Pittsburgh	2.50	2.50	2.50	2.25
Plates, Philadelphia	2.558	2.558	2.558	2.30
Plates, Chicago	2.50	2.50	2.50	2.25
Sheets, hot rolled, Pittsburgh	2.425	2.425	2.425	2.20
Sheets, cold-rolled, Pittsburgh	3.275	3.275	3.275	3.05
Sheets, No. 24 galv., Pittsburgh	4.05	4.05	4.05	3.70
Sheets, hot-rolled, Gary	2.425	2.425	2.425	2.20
Sheets, cold-rolled, Gary	3.275	3.275	3.275	3.05
Sheets, No. 24 galv., Gary	4.05	4.05	4.05	3.70
Hot-rolled strip, over 6 to 12-in., Pitts.	2.35	2.35	2.35	2.10
Cold-rolled strip, Pittsburgh	3.05	3.05	3.05	2.80
Bright basic, bess. wire, Pittsburgh	3.05	3.05	3.05	2.75
Wire nails, Pittsburgh	3.75	3.75	3.75	2.90
Tin plate, per base box, Pittsburgh	$5.25	$5.25	$5.25	$5.00

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$38.00	$38.00	$38.00	$36.00
Slabs, Pittsburgh, Chicago	39.00	39.00	39.00	36.00
Rerolling billets, Pittsburgh	39.00	39.00	39.00	36.00
Wire rods, No. 5 to ⅜-inch, Pitts.	2.30c	2.30c	2.30c	2.15c

Pig Iron

	Oct. 5, 1946	Sept., 1946	*July, 1946	Oct., 1945
Bessemer del. Pittsburgh	$29.77	$29.77	$27.69	$26.35
Basic, Valley	28.00	28.00	26.00	24.68
Basic, eastern del. Philadelphia	29.93	29.93	27.93	26.53
No. 2 fdry., del. Pgh. N. & S. sides	29.27	29.27	27.19	25.88
No. 2 foundry, Chicago	28.50	28.50	26.50	25.19
Southern No. 2, Birmingham	24.88	24.88	22.88	21.57
Southern No. 2, del Cincinnati	28.94	28.94	26.94	25.50
No. 2 fdry., del. Philadelphia	30.43	30.43	28.43	27.03
Malleable, Valley	28.50	28.50	26.50	25.15
Malleable, Chicago	28.50	28.50	26.50	25.19
Charcoal, low phos., fob Lyles, Tenn.	33.00	33.00	33.00	33.00
Gray forge, del McKees Rocks, Pa.	28.61	28.61	28.61	25.49
Ferromanganese, fob cars, Pittsburgh	140.00	140.00	140.00	140.25

Scrap

Heavy melting steel, No. 1, Pittsburgh	$20.00	$20.00	$20.00	$20.00
Heavy melt, steel, No. 2, E. Pa.	18.75	18.75	18.75	18.75
Heavy melting steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	25.00	23.75	20.00	20.00

Coke

Connellsville, furnace ovens	$8.75	$8.75	$8.75	$7.50
Connellsville, foundry ovens	9.50	9.50	9.50	8.25
Chicago, by-product fdry., del.	15.10	15.10	15.10	13.75

* $2 higher on bessemer, basic, foundry and malleable on adjustable pricing contracts.

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Finished steel quoted in cents per pound and semifinished in dollars per gross ton, except as otherwise noted. Delivered prices do not include the 3 per cent federal tax on freight. Pricing on rails was changed to net ton basis as of Feb. 15, 1946.

Semifinished Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, $33, fob mill; forging quality, $38, Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown.

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, Coatesville, uncrop, $48.69.

Rerolling, Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $39; Detroit, del., $41; Duluth (billets), $41; Pac. ports (billets), $51. (Andrews Steel Co., carbon slabs, $41; Northwestern Steel & Wire Co., $41, Sterling, Ill.; Granite City Steel Co., $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co., $58.64, Pac. ports.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $47; Detroit, del., $49; Duluth, billets, $49; forging billets fob Pac. ports, $59.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 fob Toronto, O.; Geneva Steel Co., $64.64, Pacific ports.)

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $58.43; del. Detroit $60.43; eastern Mich. $61.43.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $38. (Empire Sheet & Tin Plate Co., Mansfield, O., carbon, sheet bars, $39, fob mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb, 2.05c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—⅜ in. inclusive, per 100 lb, $2.30. Do., over ⅜—41/64-in., incl., $2.45; Galveston, base, $2.40 and $2.55, respectively. Worcester add $0.10; Pacific ports $0.50.

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3-in.: Pittsburgh, Youngstown, Chicago, Gary, Cleveland, Buffalo, Birmingham base, 20 tons one size, 2.50c; Duluth, base, 2.60c; Detroit, del., 2.60c; eastern Mich., 2.65c; New York, del., 2.86c; Phila., del., 2.86c; Gulf ports, dock, 2.85c; Pac., ports, dock, 3.15c. (Sheffield Steel Corp. may quote 2.75c, fob St. Louis; Josiyn Mfg. & Supply Co., 2.55c, fob Chicago.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.

Hot-Rolled Alloy Bars: Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.921c; Detroit, del., 3.021c. (Texas Steel Co. may use Chicago base price as maximum fob Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.108	4300	$1.839
2300	1.839	4600	1.298
2500	2.759	4800	2.326
3000	0.541	5100	0.379
3100	0.920	5130 or 5152	0.494
3200	1.461	6120 or 6152	1.078
3400	3.462	6145 or 6150	1.298
4000	0.487	8612	0.703
4100 (.15-.25 Mo)	0.757	8720	0.757
(.20-.30 Mo)	0.812	9830	1.407

* Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 20,000-39,999 lb, 3.10c; Detroit, 3.15c; Toledo, 3.25c.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 3.625c; Detroit, del., 3.725c; eastern Mich., 3.755c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base, 2.35c; Detroit, del., 2.45c; eastern Mich. and Toledo, 2.50c; Gulf ports, dock, 2.70c; Pacific ports dock, 2.75c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo, base, 2.35c; Detroit, del., 2.45c; eastern Mich. and Toledo, del., 2.50c; Gulf ports, dock, 2.70c.

Iron Bars: Single refined, Pitts., 4.76c; double refined, 5.84c; Pittsburgh, staybolt, 6.22c; Terre Haute, single ref., 5.42c; double ref., 6.76c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base, 2.425c; Granite City, base, 2.525c; Detroit, del., 2.525c; eastern Mich., del., 2.575c; Phila., del., 2.615c; New York, del., 2.685c; Pacific ports, 2.975c. (Andrews Steel Co. may quote hot-rolled sheets for shipment to the Detroit area on the Middletown, O., base; Alan Wood Steel Co., Conshohocken, Pa., may quote 3.00c on hot carbon sheets, Sparrows Point, Md.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.275c; Granite City, base, 3.375c; Detroit, del., 3.375c; eastern Mich., del., 3.425c; New York, del., 3.615c; Phila., del., 3.635c; pacific ports, 3.925c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base, 4.05c; Granite City, base, 4.15c; New York, del., 4.31c; Phila., del., 4.24c; Pacific ports, 4.60c.

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29-gage, per square, 3.73c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16-gage not corrugated, copper alloy, 4.15c; Granite City, 4.25c; Pacific ports, 4.60c; copper iron, 4.50c; pure iron, 4.50c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.60c.

Aluminized Sheets, 20 gage: Pittsburgh, hot-dipped, coils or cut to lengths 9.00c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.20c; Granite City, base 3.30c; Detroit, del., 3.30c; eastern Mich., 3.35c; Pacific ports, 3.85c; 20-gage: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 3.80c; Detroit, del., 3.90c; eastern Mich., 3.95c; Pacific ports, 4.45c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.90c	4 65c	4.00c
Armature	4.25c	5.00c	4.35c
Electrical	4.75c	5 50c	4 85c
Motor	5.425c	6.175c	5.525c
Dynamo	6.125c	6.875c	6.225c
Transformer			
72	6.625c	7.375c	.....
65	7 625c	8.375c	.....
58	8.125c	8.875c	.....
52	8.925c	9.675c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary Cleveland, Birmingham, Youngstown, Middletown, 6-in. and narrower: Base, 2.45c; Detroit, del., 2.55c; eastern Mich., del., 2.60c; Pacific ports, 3.10c. (Superior Steel Corp. may quote 3.30c, Pitts.)

Over 6-in.: Base, 2.35c; Detroit, del., 2.45c; eastern Mich., del., 2.50c; Pacific ports, 3.00c. (Superior Steel Corp. may quote 3.20c, Pitts.)

Cold-Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less, 3.05c; Chicago, base, 3.15c; Detroit, del., 3.15c; eastern Mich., del., 3.20c; Worcester, base, 3.25c. (Superior Steel Corp. may quote 4.70c, Pitts.)

Cold-Finished Spring Steel: Pittsburgh, Cleveland base, 0.26-0.50 carbon, 3.03c. Add 0.20c for Worcester.

Tin, Terne Plate

(OPA ceiling prices announced March 1, 1946.)

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb base box, $5.25; Granite City, Birmingham, Sparrows Point, $5.35.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb base box 0.25 lb tin, $4.60; 0.50 lb tin, $4.75; 0.75 lb tin, $4.90; Granite City, Birmingham, Sparrows Point, $4.70, $4.85, $5.00, respectively.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29-gage and lighter, 3.30c; Granite City, Birmingham, Sparrows Point, 3.40c; Pacific ports, boxed, 4.30c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted, 4.05c; Pacific ports, 4.80c.

Manufacturing Ternes (Special Coated): Pittsburgh, Chicago, Gary, 100-base box, $4 55; Granite City, Birmingham, Sparrows Point, $4.65.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I. C. 8-lb $12.50; 15-lb $14.50; 20-lb $15.50 (nom.); 40-lb $20.00 (nom.).

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.50c; New York, del., 2.71c; Phila., del., 2.558c; St. Louis, 2.74c; Boston, del., 2.86c; Pacific ports, 3.05c; Gulf ports, 2.85c.

(Granite City Steel Co. may quote carbon plates 2.65c fob DPC mill; Geneva Steel Co., Provo, Utah, 3.20c fob Pac. ports; Central Iron & Steel Co., Harrisburg, Pa., 2.80c, basing points; Lukens Steel Co., Coatesville, Pa., 2.75c, base; Worth Steel Co., Claymont, Del., 2.60c, base; Alan Wood Steel Co., Conshohocken, Pa., 2.75c base.)

Floor Plates: Pittsburgh, Chicago, 3.75c; Pacific ports, 4.40c; Gulf ports, 4.10c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.787c; Gulf ports, 4.273c; Pacific ports, 4.49c.

Clad Steel Plates: Coatesville, 10% cladding: nickel-clad, 18.72c; inconel-clad, 26.00c; monel-clad, 24.96c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.35c; New York, del., 2.54c; Phila., del., 2.48c; Pacific ports, 3.00c; Gulf ports, 2.70c.

(Phoenix Iron Co., Phoenixville, Pa., may quote the equivalent of 2.60c, Bethlehem, Pa., on the general range and 2.70c on beams and channels from 4 to 10 inches.)

Steel Piling: Pittsburgh, Chicago, Buffalo, 2.65c; Pacific ports, 3.20c.

Wire and Wire Products

(Fob Pittsburgh, Chicago, Cleveland and Birmingham, per 100 pounds)

Wire to Manufacturers in carloads

Bright basic or bessemer	*$3.05
Spring (except Birmingham)	*$4.00

Wire Products to Trade

Nails and staples

Standard and cement-coated	†$3.75
Galvanized	‡$3.40

Wire, Merchant Quality

Annealed	§$3.80
Galvanized	§$3.85

(Fob Pittsburgh, Chicago, Cleveland, Birmingham, per base column)

Woven fence, 15½ gage and heavier	72
Barbed wire, 80-rod spool	**79
Barbless wire, twisted	**79
Fence posts	74
Bale ties, single loop	72½

*Add $0.10 for Worcester, $0.05 for Duluth and $0.50 for Pacific ports.

†Add $0.30 for Worcester, $0.50 for Pacific ports. Nichols Wire & Steel may quote $4.25; Pittsburgh Steel Co., $4.10.

‡Add $0.50 for Pacific ports.

§Add $0.10 for Worcester; $0.70 Pacific ports.

**Pittsburgh Steel Co. may quote 89.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Welded

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
⅛	53	30	¼	21	0½
¼ & ⅜	56	37½	⅜	27	7
½	60½	48	1-1¼	31	13
¾	63½	52	1½	35	15½
1-3	65½	54½	2	34½	15

Lap Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
2	58	46½	1¼	20	0½
2½-3	61	49½	1½	25½	7
3½-6	63	51½	2	27½	9
7-8	62	49½	2½-3½	28½	11½
9-10	61½	49	4	30½	15
11-12	60½	48	4½-8	29½	14
			9-12	25½	9

Boiler Tubes: Net base prices per 100 feet fob Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Elec. Weld— Hot Rolled	Cold Rolled
1"	13	....	$9 90	$9 36	$9.65
1¼"	13	....	11 73	9 63	11.43
1½"	13	$10.91	12.96	10.63	12 64
1¾"	13	12 41	14 75	12 10	14.37
2"	13	13.90	16.52	13 53	16 19
2¼"	13	15 50	18 42	15 06	18 03
2¼"	12	17 07	20.28	16 57	19 83
2½"	12	18 70	22 21	18 11	21 68
2¾"	12	19 52	23 54	19 17	22 95
3"	12	20 79	24 71	20 05	24 02
3½"	11	26 24	31 18	25.30	30.29
4"	10	32 56	38 68	31.32	37.52
4½"	9	43 16	51 29	....	....
5"	9	49 96	59 36	....	....
6"	7	76 71	91.14	....	....

Pipe, Cast Iron: Class B. 6-in. and over, $60 per net ton, Birmingham; $65, Burlington, N. J.; $62.80, del., Chicago; 4-in. pipe, $5 higher. Class A pipe, $3 a ton over class B.

Rails, Supplies

Standard rails, over 60-lb, fob mill, net ton, $43.40. Light rails (billet), Pittsburgh, Chicago, Birmingham, net ton, $49.18.

Relaying rails, 35 lb and over, fob railroad and basing points, $31-$33.

Supplies: Track bolts, 6.50c; heat treated, 6.75c. Tie plates $51 net ton, base, Standard spikes, 3.65c.

Bolts, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chicago. Additional discounts: 5 for carloads; 10 for full containers, except tire, step and plow bolts.

(Ceiling prices advanced 12 per cent, effective July 27, 1946; discounts remain unchanged.)

Carriage and Machine

½ x 6 and smaller	65¼ off
Do., ⅝ and ⅝ x 6-in. and shorter	63½ off
Do., ⅝ to 1 x 6-in. and shorter	61 off
1¼ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages, nuts separate, 71-10 off, nuts attached, 71 off; bulk, 80 off on 15,000 of 3-in. and shorter, or 5000 over 3 in., nuts separate.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅜-in. and smaller	..	64
½-in. and smaller	62	..
½-in.-1-in.	..	60
⅞-in.-1-in.	59	..
1⅛-in.-1½-in.	57	58
1⅝-in. and larger	56	..

Additional discount of 10 for full kegs.

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset 1-in. and smaller	71 off
Headless, ¼-in. and larger	60 off
No. 10 and smaller	70 off

Rivets

Fob Pittsburgh, Cleveland, Chicago, Birmingham

Structural	4.75c
⅞-inch and under	*65-5 off

*Plus 12 per cent increase on base prices, effective July 26.

Washers, Wrought

Fob Pittsburgh, Chicago, Philadelphia, to jobbers and large nut and bolt manufacturers, lcl ..... $2.75-$3.00 off

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb; reg. carbon 15.15c; extra carbon 19 48c; special carbon 23.80c; oil-hardening 25.97c; high carbon-chromium 46.53c.

W	Cr	V	Mo	Base, per lb
18.00	4	1	....	72.49c
1.5	4	1	8.5	58 43c
....	4	2	3	58.43c
6.40	4 15	1.90	5	62.22c
5.50	4.50	4	4.50	75.74c

Stainless Steels

Base, Cents per lb

CHROMIUM NICKEL STEELS

	Bars	Plates	Sheets	H.R. Strip	C.R. Strip
302	25 96c	29 21c	36 79c	23 93c	30 30c
303	28 13	31 38	38 95	29 21	35 71
304	27 05	31 38	38 95	25 45	32.46
308	31 38	36 79	44 36	30.84	37 87
309	38 95	43 28	50 85	40.03	50 85
310	53.02	56 26	57 35	52.74	60.89
312	38.95	43 28	53 02	....	....
*316	43 28	47 61	51 94	43.28	51 94
§321	31 38	36 79	44 36	31 65	41.12
†347	35 71	41 12	48 69	35 71	45.44
431	20 56	23 80	31 98	18.94	24.35

STRAIGHT CHROMIUM STEEL

403	23 93	26 51	31 92	22.99	29.21
**410	20 02	23 93	28 67	18.39	23.80
416	20 56	23 80	29 21	19 75	25 45
††420	25 96	30 84	36 25	25 70	39 49
430	20 56	23 80	31 38	18.94	24.35
‡‡430F	21 10	24 35	31 92	20 29	26 51
440A	25.96	30 84	36 25	25 70	39 49
442	24 35	27 59	35 17	25 96	34.62
443	24 35	27 59	35 17	25 96	34.62
446	29 76	33 00	39 19	37 87	56.26
501	8.66	12 98	17 04	12 98	18.39
502	9 74	14 07	18.12	14 07	19.48

STAINLESS CLAD STEEL (20%)

(Fob Pittsburgh and Washington, Pa., plate prices include annealing and pickling.)

304	.....	19 48	20 56	.....	.....
410	.....	17 31	18 39	.....	.....
430	.....	17 85	18 94	.....	.....
446	.....	19.48	20.56	.....	.....

* With 2-3% molybdenum § With titanium. † With columbium. ** Plus machining agent. †† High carbon. ‡‡ Free machining.

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*$8.75
Connellsville, foundry	9.25- 9 75
New River, foundry	10 25-10 50
Wise county, foundry	9.00- 9.50
Wise county, furnace	8.50- 9.00

By-Product Foundry

Kearney, N. J., ovens	14.40
Chicago, outside delivered	14.75
Chicago, delivered	15 10
Terre Haute, delivered	14.85
Milwaukee, ovens	15.10
New England, delivered	16 00
St. Louis, delivered	†15.10
Birmingham, delivered	12.25
Indianapolis, delivered	14 85
Cincinnati, delivered	14 60
Cleveland, delivered	14 85
Buffalo delivered	14 75
Detroit, delivered	15.10
Philadelphia, delivered	14.60

* Operators of hand-drawn ovens using trucked coal may charge $9.35; retroactive to May 17, 1946, on adjustable pricing.

† 15.68 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal, freight allowed east of Omaha.	
Pure and 90% benzol	15 00c
Toluol, two degree	22.00c
Industrial xylol	22.00c
Per pound fob works	
Phenol (car lots, returnable drums)	11.25c
Do., less than carlots	12.00c
Do., tank cars	10.25c
Eastern plants, per pound	
Naphthalene flakes, balls, bbl, to jobbers, "household use"	9.00c
Per ton, bulk, fob plants	
Sulphate of ammonia	$30.00

WAREHOUSE STEEL PRICES

Base delivered prices, cents per pound, for delivery within switching limits, subject to established extras. Quotations based on mill prices announced March 1, 1946

	Hot-rolled bars	Structural shapes	Plates	Floor plates	Hot-rolled sheets (10-gage base)	Hot-rolled strip (14-gage and lighter 6-in and narrower)	Hot-rolled strip (12-gage and heavier than 6-inch)	Galvanized flat sheets (24-gage base)	Cold-rolled sheets (17-gage base)	Cold-finished bars	Cold-rolled strip
Boston	4.356[1]	4.203[1]	4.203[1]	6.039[1]	4.050[1]	5.548[1]	4.418[1]	5.725[16]	5.031[16]	4.656[21]	4.965
New York	4.134[1]	4.038[1]	4.049[1]	5.875[1]	3.858[1]	4.375[1]	4.275[1]	5.501[13]	4.838[14]	4.584[21]	5.075
Jersey City	4.155[1]	4.018[1]	4.049[1]	5.875[1]	3.856[1]	4.375[1]	4.275[1]	5.501[13]	4.890[14]	4.605[21]	5.075
Philadelphia	4.114[1]	3.937[1]	3.875[1]	5.564[1]	3.774[1]	4.664[1]	4.554[1]	5.499[15]	5.139[23]	4.564[21]	5.064
Baltimore	4.093[1]	4.05[1]	3.865[1]	5.543[1]	3.64[1]	4.293[1]	4.193[1]	5.365[17]	5.118[20]	4.543[21]	....
Washington	4.232[1]	4.22[1]	4.067[1]	5.632[1]	3.842[1]	4.432[1]	4.332[1]	5.667[17]	5.007[24]	4.532[21]	....
Norfolk, Va.	4.377[1]	4.303[1]	4.262[1]	5.777[1]	4.037[1]	4.927[1]	4.477[1]	5.862[17]	4.552[24]	4.677[21]	....
Bethlehem, Pa.*	....	3.70[1]	....	....	....	....	....	....	....	....	....
Claymont, Del.*	....	....	3.70[1]	....	....	....	....	....	....	....	....
Coatesville, Pa.*	....	....	3.70[1]	....	....	....	....	....	....	....	....
Buffalo (city)	3.60[1]	3.65[1]	3.92[1]	5.55[1]	3.575[1]	4.21[1]	4.11[1]	5.20[15]	4.625[16]	4.20[21]	4.96
Buffalo (country)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.475[1]	3.85[1]	3.750[1]	5.10[15]	4.525[16]	4.10[21]	4.60
Pittsburgh (city)	3.60[1]	3.65[1]	3.65[1]	5.25[1]	3.575[1]	3.95[1]	3.850[1]	5.327[13]	4.625[24]	4.20[21]	4.70
Pittsburgh (country)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.475[1]	3.85[1]	3.750[1]	5.10[13]	4.525[24]	4.10[21]	4.60
Cleveland (city)	3.60[1]	3.88[1]	3.65[1]	5.48[1]	3.575[1]	3.95[1]	3.850[1]	5.347[13]	4.625[24]	4.20[21]	4.70
Cleveland (country)	3.50[1]	....	3.55[1]	....	3.475[1]	3.85[1]	3.750[1]	....	4.525[24]	4.10[21]	4.00
Detroit	3.70[1]	3.952[1]	3.90[1]	5.572[1]	3.675[1]	4.050[1]	3.950[1]	5.491[15]	4.725[24]	4.25[13]	4.95
Omaha (city, del.)	4.32[1]	4.37[1]	4.37[1]	5.97[1]	4.045[1]	4.52[1]	4.42[1]	6.00[15]	5.72[24]	4.945[21]	....
Omaha (country)	4.22[1]	4.27[1]	4.27[1]	5.87[1]	3.945[1]	4.42[1]	4.32[1]	5.90[15]	....	....	....
Cincinnati	3.902[1]	3.983[1]	3.952[1]	5.583[1]	3.671[1]	4.046[1]	3.946[1]	5.296[15]	4.271[24]	4.602[21]	....
Youngstown*	....	....	....	....	....	....	....	4.85[12]	....	....	....
Middletown, O.*	....	....	....	....	3.475[1]	3.85[1]	3.750[1]	5.10[10]	....	....	....
Chicago (city)	3.75[1]	3.80[1]	3.80[1]	5.40[1]	3.475[1]	3.95[1]	3.850[1]	†5.40[15]	4.425[24]	4.20[21]	4.90
Milwaukee	3.908[1]	3.958[1]	3.958[1]	5.558[1]	3.633[1]	4.108[1]	4.008[1]	†5.558[15]	4.583[24]	4.358[21]	5.058
Indianapolis	3.83[1]	3.88[1]	3.88[1]	5.48[1]	3.743[1]	4.118[1]	4.018[1]	5.368[15]	4.793[24]	4.43[21]	5.060
St. Paul	4.092[2]	4.142[2]	4.142[2]	5.742[2]	3.817[2]	4.292[2]	4.192[2]	5.666[15]	4.767[24]	4.852[21]	5.398
St. Louis	3.918[1]	3.968[1]	3.968[1]	5.568[1]	3.643[1]	4.118[1]	4.018[1]	5.622[15]	4.593[24]	4.522[21]	5.222
Memphis, Tenn.	4.296[1]	4.346[1]	4.346[1]	6.071[1]	4.221[1]	4.596[1]	4.496[1]	5.746[15]	..	4.821[21]	....
Birmingham	3.75[1]	3.80[1]	3.80[1]	6.153[1]	3.675[1]	4.05[1]	4.05[1]	5.20[15]	5.077[24]	4.99[21]	5.465
New Orleans (city)	4.358[1]	4.408[1]	4.408[1]	6.329[1]	4.283[1]	4.653[1]	..	5.808[15]	5.304[24]	5.079[21]	....
Houston, Tex.	4.00[2]	4.50[1]	4.50[1]	5.75[2]	3.988[2]	4.668[2]	4.563[2]	5.763[24]	5.819[10]	4.10[21]	....
Los Angeles	4.65[4]	4.90[4]	5.20[4]	7.45[4]	5.225[4]	5.30[4]	5.200[4]	6.55[12]	7.425[6]	6.033[21]	5.868
San Francisco	4.20[7]	4.15[7]	4.15[7]	5.85[7]	4.125[7]	5.85[1]	4.50[1]	6.35[15]	6.875[15]	5.783[21]	7.588
Portland, Oreg.	4.70[27]	4.70[27]	5.00[27]	6.75[27]	4.875[27]	6.65[27]	5.000[27]	6.20[15]	6.825[15]	5.983[15]	....
Tacoma, Wash.	4.60[6]	4.70[6]	5.00[6]	6.75[6]	4.87[6]	5.80[6]	4.60[6]	6.40[15]	6.55[15]	6.23[21]	....
Seattle	4.60[6]	4.70[6]	5.00[6]	6.75[6]	4.87[6]	5.80[6]	4.60[6]	6.40[15]	6.55[15]	6.23[21]	....

*Basing point cities with quotations representing mill prices, plus warehouse spread; †open market price.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]—300 to 4999 pounds.

ORES

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$5.45
Mesabi nonbessemer	5.05
High phosphorus	5.05
Mesabi bessemer	5.20
Old range nonbessemer	5.30

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	13.00

Foreign Ore

Cents per unit, cif Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mn.	Nom.
N. African low phos.	Nom.
Swedish basic, 60 to 68%	13.00
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% fob Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese Wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

Gross ton fob cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Oreg., or Tacoma, Wash. (S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	$39.75
48% 3:1	41.00
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80

Brazilian—nominal

44% 2.5:1 lump	$33.65
48% 3:1 lump	43.50

Rhodesian

45% no ratio	$28.30
48% no ratio	31.00
48% 3:1 lump	41.00

Domestic (seller's nearest rail)

48% 3:1	$43.50

less $7 freight allowance.

Manganese Ore

Sales prices of Office of Metals Reserve, cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91c; prices include duty on imported ore and are subject to established premiums, penalties and other provisions. Price at basing points which are also points of discharge of imported manganese ore is fob cars, shipside, at dock most favorable to the buyer. Outside shipments direct to consumers at 15c to 17c per unit less than Metal Reserve prices.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Chemical Composition Limits, Per Cent					
	Carbon	Mn	Si	Cr	Ni	Mo
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30

Basic open-hearth Electric furnaces			
Bars per 100 lb	Billets per GT	Bars per 100 lb	Billets per GT
$0.812	$16.230	$1.353	$27.050
.812	16.230	1.353	27.050
.866	17.312	1.407	28.132
.703	14.066	1.244	24.886
1.298	25.968	1.677	33.542
1.298	25.968	1.677	33.542

Extras are in addition to a base price of 2.921c, per pound on finished products and $58.43 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

PIG IRON

Maximum prices per gross ton fixed by OPA schedule No. 10, last amended July 27, 1946: $2 increase may be charged on adjustable pricing contracts made between May 29 and July 27. Delivered prices do not include 3 per cent federal tax, effective Dec. 1, 1942.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$29.50	$29.00	$30.50	$30.00
Newark, N. J., del.	31.20	30.70	32.20	31.70
Brooklyn, N. Y., del.	32.28	....	....	32.78
Birdsboro, Pa., base	29.50	29.00	30 50	30.00
Birmingham, base	24.88	23.50	29.50	....
Baltimore, del.	30.22	....	....	....
Boston, del.	29.68	....	....	....
Chicago, del.	28.72	....	....	....
Cincinnati, del.	28.94	28.06	....	....
Cleveland, del.	28.62	27.74	....	....
Newark, N. J.	30.82	....	....	....
Philadelphia, del.	30.05	29.55	....	....
St. Louis, del.	28.62	29 54	....	....
Buffalo, base	28.50	27.50	29.50	29.00
Boston, del.	30.06	29.56	31.06	30.56
Rochester, del.	30.03	....	31.03	30.53
Syracuse, del.	30.58	....	31.58	31.08
Chicago, base	28.50	28.00	29.00	28.50
Milwaukee, del.	29.73	29.23	30.23	29 73
Muskegon, Mich., del.	32.05	....	....	32.05
Cleveland, base	28.50	28.00	29.00	28.50
Akron, Canton, del.	30.04	29.54	30.54	30.04
Detroit, base	28.50	28.00	29.00	28.50
Saginaw, Mich., del.	30.81	30.31	31.31	30.81
Duluth, base	29.00	28.50	29 50	29.00
St. Paul, del.	31.13	30.63	31.63	31.13
Erie, Pa., base	28.50	28.00	29.50	29 00
Everett, Mass., base	29.50	29.00	30.50	30.00
Boston, del.	30.06	29.56	31 06	30.56
Granite City, Ill., base	28.50	28.00	29.00	28.50
St. Louis, del.	29.00	28.50	....	29 00
Hamilton O., base	28.50	28.00	....	28.50
Cincinnati, del.	29.68	29.18	....	29.68
Neville Island, Pa., base	28.50	28.00	29.00	28.50
*Pittsburgh, del., N.&S. sides	29.27	28.77	29.77	29.27
Provo, Utah, base	26.50	26.00	....	....
Sharpsville, Pa., base	28.50	28.00	29.00	28.50
Sparrows Point, base	29.50	29.00	....	....
Baltimore, del.	30.60	....	....	....
Steelton, Pa., base	....	29.00	....	....
Swedeland, Pa., base	29.50	29.00	30.50	30.00
Philadelphia, del.	30.43	29.93	....	30.93
Toledo, O., base	28.50	28.00	29.00	28.50
Youngstown, O., base	28.50	28.00	29.00	28.50
Mansfield, O., del.	30.66	30.16	31.16	30.66

*To Neville Island base add: 61c for McKees Rocks, Pa.; 93c Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa; 97c (water), Monongahela; $1.24, Oakmont, Verona; $1.38, Brackenridge.

Exceptions to above prices: Struthers Iron & Steel Co., Struthers, O., may charge 50 cents a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable pig iron. Republic Steel Corp. may quote $2 a ton higher for foundry and basic pig iron on the Birmingham base.

High Silicon, Silvery

6.00-6.50 per cent (base) $34.00
6.51-7.00 .$35.00 9.01- 9.50. 40.00
7.01-7.50.. 36.00 9.51-10.00. 41.00
7.51-8.00.. 37.00 10.01-10.50. 42.00
8.01-8.50.. 38.00 10.51-11.00. 43.00
8.51-9.00.. 39.00 11.01-11.50. 44.00

Fob Jackson county, O., per gross ton. Buffalo base $1.25 higher. Buyer may use whichever base is more favorable.

Electric Furnace Ferrosilicon: Si 14.01 to 14.50%, $50 Jackson co.; each additional 0.50% silicon up to and including 18% add $1; low impurities not exceeding 0.005 P, 0.40 Si, 1.0% C, add $1.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Semi-cold blast, low phosphorus.

Fob furnace, Lyles, Tenn. $33.00 (For higher silicon irons a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $28.00
Valley base 28.00

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Buffalo, N. Y., $34.00 base; $35.38, del., Philadelphia. Intermediate phosphorus. Central Furnace, Cleveland, $31.00.

Differentials

Basing point prices are subject to following differentials:

Silicon: An additional charge not to exceed 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

Manganese: An additional charge not to exceed 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Refractories

Per 1000, fob shipping point
Net prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky $81.00

High Heat Duty

Pa., Ill., Md., Mo., Ky. 65.00
Ala., Ga. 66.00
N. J. 70.00

Intermediate Heat Duty

Ohio 57.00
Pa., Ill., Md., Mo., Ky. 59.00
Ala., Ga. 51.00
N. J. 62.00

Low Heat Duty

Pa., Md., Ohio 51.00

Malleable Bung Brick

All bases 75.00

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry Press 42.00
Wire Cut 40.00

Silica Brick

Pennsylvania 65.00
Joliet, E. Chicago 74.00
Birmingham, Ala. 65.00

Magnesite

Domestic dead-burned grains, net ton, fob Chewelah, Wash.
Bulk 22.00
Bags 26.00

Basic Brick

Net ton, fob Baltimore, Plymouth Meeting, Chester, Pa.
Chrome brick 54.00
Chem. bonded chrome 54.00
Magnesite brick 75.00
Chem. bonded magnesite 68.00

Fluorspar

Metallurgical grade, fob shipping point in Ill., Ky., net ton, carloads, effective CaF² content, 70% or more, $33; 65% to 70%, $32; 60% to 65%, $31; less than 60%, $30.

Open Market Prices of Leading Ferroalloy Products

Spiegeleisen: 19-21% carlot per gross ton, Palmerton, Pa., $36; Pittsburgh, $40.50; Chicago, $40.60.

Ferromanganese, standard: 78-82% c.l. gross ton, duty paid, $135 fob cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer, Rockdale or Rockwood, Tenn. (where Tennessee Products Co. is producer), Birmingham, Ala. (where Sloss-Sheffield Steel & Iron Co. is producer); $140 fob cars, Pittsburgh (where Carnegie-Illinois Steel Corp. is producer); add $6 for packed c.l., $10 for ton, $13.50 for less ton; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%.

Ferromanganese, low carbon: Eastern zone; Special, 21c; regular, 20.50c; medium, 14.50c; central zone: Special, 21.30c; regular, 20.80c; medium, 14.80c; western zone: Special, 21.55c; regular, 21.05c; medium, 15.75c. Prices are per pound contained Mn, bulk carlot shipments, fob shipping point, freight allowed. Special low-carbon has content of 90% Mn, 0.10% C, and 0.06% P.

Ferromanganese Briquets: (Weight approx. 3 lb and containing exactly 2 lb Mn) per lb of briquets. Contract, carlots, bulk 0.0605c, packed 0.063c, tons 0.0655c, less 0.068c, eastern, freight allowed; 0.063c, 0.0655c, 0.0755c and 0.078c, central; 0.066c, 0.0685c, 0.0855c and 0.088c, western; spot up 0.25c.

Ferrotungsten: Spot 10,000 lb or more, per lb contained W, $1.90; contract, $1.88; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb contained Ti; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5c per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb contained Ti; ton lots $1.35; less-ton lots $1.40 eastern. Spot up 5c per lb.

Ferrotitanium, High-Carbon: 15-20% contract basis, per net ton, fob Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis, 6.8% C $142.50; 3-5% C $157.50.

Ferrovanadium: V 35-55%, contract basis, per lb contained V, fob producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Ferromolybdenum: 55-75% per lb. contained Mo, fob. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% P content with unitage of $3 for each 1% of P above or below the base; gross tons per carload fob sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Contract, lump, packed; eastern zone quotations: 90-95% c.l. 12.65c, ton lots 13.10c, smaller lots 13.50c; 80-90% c.l. 10.35c, ton lots 10.85c, smaller lots 11.35c; 75% c.l. 9.40c, ton lots 9.95c, smaller lots 10.45c; 50% c.l. 7.90c, ton lots 8.50c, smaller lots 9.10c. Prices are fob shipping point, freight allowed, per lb of contained Si. Spot prices 0.25c higher on 80-90%, 0.30c on 75%, 0.45c on 50%. Deduct 0.85c for bulk carlots.

Ferro-Boron: (B 17.50% min., Si 1.50% max., Al 0.50% max. and C 0.50% max.) per lb of alloy contract ton lots $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Ferrocolumbium: 50-60% per lb contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices up 10 cents.

Ferrochrome: Contract, lump, packed; high carbon, eastern zone, c.l. 15.05c, ton lots 15.55c; central zone, add 0.40c and 0.65c; western zone, add 0.5c and 1.85c; high carbon, high nitrogen, add 5c to all high carbon ferrochrome prices. Deduct 0.55c for bulk carlots. Spot prices up 0.25c.

Low carbon, eastern zone, bulk, c.l., max. 0.06% C 23c; 0.1% 22.50c, 0.15% 22c, 0.2% 21.50c, 0.5% 21c, 1% 20.50c, 2% 19.50c, add 1c for 2000 lb to c.l.; central zone, add 0.4c for bulk, c.l., and 0.65c for 2000 lb to c.l.; western zone, add 0.5c for bulk, c.l., and 1.85c for 2000 lb to c.l.; carload packed differential 0.45c. Prices are per pound of contained Cr, fob shipping points. **Low carbon, high nitrogen:** Add 2c to low carbon ferrochrome prices. For higher nitrogen low carbon, add 2c for each 0.25% of nitrogen over 0.75%.

Ferrochrome, Special Foundry: (Cr 62-66%, C about 5-7%): Contract, lump, packed, eastern zone, freight allowed, c.l. 15.60c, ton lots 16.10c, less than ton 16.75c; central zone, add 0.40c for c.l. and 0.65c for smaller lots; western zone, add 0.5c for c.l. and 1.85c for smaller lots. Deduct 0.55c for bulk carlots.

S. M. Ferrochrome, high carbon (Cr 60-65%, Si, Mn and C 4-6% each): Contract, lump, packed, eastern zone, freight allowed, c.l. 16.15c, ton lots 16.65c, less ton 17.20c; central zone, add 0.40c for c.l. and 0.65c for smaller lots, western zone, add 0.5c for c.l. and 1.85c for smaller lots. Prices are per lb of contained chromium; spot prices 0.25c higher. Deduct 0.85c for bulk carlots.

S.M. Ferrochrome, low carbon: (Cr 62-66%, Si 4-6%, Mn 4-6% and C 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.40c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium, 20.40c, 20.80c, 20.95c and 22.65c, central; 21.00c, 21.40c, 22.85c and 23.85c, western; spot up 0.25c.

Ferrochrome Briquets: Containing exactly 2 lb. Cr, packed eastern zone, c.l. 9.50c, ton lots 9.90c, less than ton 10.10c, central zone, add 0.3c for c.l. and 0.5c for smaller lots; western zone, add 0.70c for c.l. and 2c for smaller lots. Deduct 0.30c for bulk carlots. Prices per lb of briquets; spot prices 0.25c higher.

Chromium Metal: 97% min. chromium, max. 0.50% carbon, eastern zone, per lb contained chromium bulk, c.l., 79.50c, 2000 lb to c.l. 80c; central 81c and 82.50c; western 82.25c and 84.75c; fob shipping point, freight allowed.

Chromium-Copper: (Cr 8-11%, Cu 88-90%, Fe 1% max., Si 0.60% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Calcium metal; east: Contract ton lots or more $1.35, less, $1.60, pound of metal; $1.36 and $1.61

central, $1.40 and $1.65, western; spot up 5c.

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c, and 17.85c, central; 18.05c, 19 10c and 19.60c western; spot up 0.25c.

Calcium - Silicon: (Ca 30-35%, Si 60-65% and Fe 3.00% max.), per lb. of alloy. Contract, carlot, lump 13.00c, ton lots 14.50c, less 15.50c eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up 0.25c.

Silicon Metal: Min. 97% Si and max. 1% Fe, eastern zone, bulk, c.l., 12.90c; 2000 lb to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% Si and max. 2% Fe, eastern, bulk; c.l., 12.50c, 2000 lb to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c, fob shipping point, freight allowed. Price per lb contained Si.

Silicomanganese, containing exactly 2 lb. Mn and about ⅛ lb. Si, eastern zone, bulk, c.l. 5.80c, ton lots 6.35c; central zone, add 0.25c for c.l. and 1c for ton lots; western, add 0.55c for c.l. and 0.20c for ton lots. **Ferrosilicon,** weighing about 5 lb. and containing exactly 2 lb. Si, or about 2½ lb. and containing exactly 1 lb. Si, packed, eastern zone, c.l. 3.90c, ton lots 4.15c, less ton lots 4.45c; central zone, add 0.15c for c.l. and 0.40c for smaller lots; western zone, add 0.30c for c.l. and 0.45c for smaller lots. Prices are f.o.b. shipping point, freight allowed; spot prices 0.25c higher. Deduct 0.30c for bulk carlots.

Manganese Metal: (Min. 96% Mn, max. 2% Fe), per lb of metal, eastern zone, bulk, c.l., 30c, 2000 lb to c.l., 32c, central, 30.25c, and 33c; western, 30.55c and 35.05c.

Electrolytic Manganese: 99.9% plus, fob Knoxville, Tenn., freight allowed east of Mississippi on 250 lb or more: Carlots 32c, ton lots 34c, drum lots 36c, less than drum lot 38c. Add 1½c for hydrogen-removed metal.

Manganese-Boron: (Mn 75% approx., B 15-20%, Fe 5% max., Si 1.50% max. and C 3% max.) per lb of alloy. Contract ton lots, $1.89, less $2 01, eastern; freight allowed; $1.903 and $2.023, central, $1.935 and $2.055 western; spot up 5c.

Nickel-Boron: (B 15-18%, Al 1% max., Si 1.50% max., C 0.50% max., Fe 3% max., Ni, balance), per lb of alloy. Contract, 5 tons or more, $1.90, 1 ton to 5 ton, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Borosil: 3 to 4% B, 40 to 45% Si, $6.25 lb contained B, fob Philo, O., freight not exceeding St. Louis rate allowed.

Bortam: B 1.5-1.9%, ton lots, 45c lb; less-ton lots, 50c lb.

Carbortam: B 0.90 to 1.15% net ton to carload, 8c per lb fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%), per lb of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed, 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up 0.25c.

Silvaz Alloy: (Si 35-40%, Va 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%), per lb of alloy. Contract, carlots 58.00c, ton lots 59 00c, less 60.00c, eastern freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up 0.25c.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7% and Fe approx. 20%) per lb of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up 0.25c.

CMSZ Alloy 4: (Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75% and C 3.00-4 50%). Contract carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up 0.25c.

CMSZ Alloy 5: (Cr 50-56%, Mn 4-6%, Si 13.50-16.00%, Zr 0.75-1.25%, C 3.50-5.00%) per lb of alloy. Contract, carlots, bulk, 10.75c, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c, 12.50c and 13.00c, central; 13.25c and 13.75c, 14.50c and 15.00c, western; spot up 0.25c.

Zirconium Alloy: 12-15%, per lb of alloy, eastern contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads, bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot up $5 per ton.

Zirconium Alloy: Zr 35-40%, eastern, contract basis, carloads in bulk or package, per lb of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot up ¼c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe) contract basis fob Niagara Falls, N. Y., lump per lb 5.88c; ton lots 6.38c; less 6.88c. Spot up ¼c.

Simanal: (Approx. 20% each Si, Mn, Al) Packed, lump, carload 9c, ton lots 9.25c, less-ton lots 9.75c per lb alloy; freight not exceeding St. Louis rate allowed.

Tungsten Metal Powder: Spot, not less than 97%, $2.50-$2 60; freight allowed as far west as St. Louis.

Grainal: Vanadium Grainal No. 1 87.5c; No. 6, 60c; No. 79, 45c; all fob Bridgeville, Pa., usual freight allowance.

Vanadium Pentoxide, technical grade: Fused, approx. 89-92% V_2O_5 and 5.84% NA_2O; or air dried, 83-85% V_2O_5 and 5.15% NA_2O, $1.10 per lb contained V_2O_5, fob plant, freight allowed on quantities of 25 lb and over to St. Louis.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, delivered at consumer's plant except where noted. For complete OPA price schedule refer to MPR-4

OPEN HEARTH AND BLAST FURNACE GRADES

	—Heavy Melting—			—Bundles—							
	No. 1	No. 2	No. 1 Busheling	No. 1	No. 2	No. 3	Machine Shop Turnings	Mixed Borings, Turnings	Short Shovel Turnings	Cast Iron Borings
‡New York	15.33	15 33	15 33		15.33	13.33	10.33	10.33	12.33	
Philadelphia	18.75	18.75	18.75	18.75	18.75	16.75	13.75	13.75	15.75	14.75
*Boston	14 06	14.06	14.06	14.06	14.06	....	9.06	9.06	11.06	....
Cleveland	19.50	19.50	19.50	19.50	19.50	....	14.50	14.50	16.50	13.50-14.00
Pittsburgh	20.00	20.00	...	20.00	20.00	....	15.00	15.00	17.00	16.00
Valley	20.00	....	....	20.00	....	....	15.00	....	17.00	16.00
Mansfield	....	....	....	....	....	....	15 00	....	....	....
Chicago	18.75	18.75	18.75	18.75	18.75	16.75	13.75	13.75	15.75	14.75
Buffalo	19.25	19.25	19.25	19 25	19.25	....	14.25	14.25	16.25	15.25
Detroit	17.32	...	17.32	17.32	....	....	12.32	...	14.32	13.32
St. Louis	17.50	....	....	....	....	....	10.50	....	12.50	....
Cincinnati	19.50	19.50	....	19.50	19.50	....	10.50-11.00	10.50-11.00	12.50-13 00	11.50-12.00
Birmingham	17.00	17.00	17.00	....	17.00	15 00	....	....	12.00	13.00
San Francisco	17.00	17.00	17.00	17.00	17.00	9.00	7.00	....	....	....
Seattle	14.50	14.50	....	....	....	....	....	....	....	....
Los Angeles	14.00	13.00	....	12.00	12.00	....	5.50	5.50	....	....

ELECTRIC FURNACE, FOUNDRY AND SPECIAL GRADES

	Bar Crops and Plate	Cast Steel	Punchings and Plate Scrap	Electric Furnace Bundles	Heavy Turnings	Alloy Free Turnings	Cut Structural and Plate Scrap 1 ft and under	Cut Structural and Plate Scrap 2 ft and under	No. 1 Chemical Cast Iron Borings	Tin Can Bundles
Philadelphia	21.25	21.25	21.25	19.75	18.25	....	21.25		•16.51	....
‡New York	....	....	17.83	16.33	....	....	17.83	17.33	14.33	....
*Boston	....	....	....	....	....	....	....	....	13.31	....
Cleveland	22.00	....	22.00	20.50	....	....	....	....	....	....
Pittsburgh	22.50	....	22.50	....	....	....	....	....	....	....
Chicago	....	....	21.25	....	....	....	....	....	....	....
St. Louis	....	20.00	....	....	....	....	....	....	....	....
Birmingham	15.50	....	....	....	....	....	19.00	18.50	....	....
San Francisco	15.50	15.50	....	....	....	7.00	18.00	17.50	....	14.50

STEEL GRADES OF RAILROAD ORIGIN

	No. 1 Heavy Melting R.R. Steel	Railroad Malleable	Axles	Rails — Rerolling	Rails — Random Lengths	Rails — Cut 3-ft and under	Rails — Cut 18-in. and under	Railroad Specialties	Uncut Tires	Angles, Splice Bars
Pittsburgh	21.00	22.00	26.00	....	21.50	23.50	....	24.50	....	....
Valley	21.00	....	....	....	....	....	....	....	....	....
†Chicago	19.75	22.00	....	22.25	20.25	22.25	23.50	22.75	....	22.25
St. Louis	....	22.00	24.50	21.00	19.00	21.50	....	....	21.00	21.00
Cincinnati	....	....	....	....	20.50-21.00	....	....	....	....	....
Birmingham	....	....	24.00	20.50	18.50	....	....	....	....	20.50
San Francisco	....	....	24.00	....	18.50	....	....	....	20.50	....
Seattle	14.50	....	....	....	....	....	....	....	....	....

CAST IRON GRADES

	No. 1 Cupola Cast	Charging Box Cast	Heavy Breakable Cast	Stove Plate	Unstripped Motor Blocks	Malleable	Brake Shoes	Clean Auto Cast	No. 1 Wheels	Burnt Cast
‡New York	25.00	21.00	20.00	23.00	20.00	24.00	....	....	....	....
*Philadelphia	25.00	21.00	20.00		20.00	24.00	17.75	27.00	22.00	....
*Boston	25.00	....	20.00	23.00				27.00	....	....
Buffalo	25.00	21.00	20.00	23.00	20.00	24.00	17.75	27.00	22.00	17.75
Cleveland	25.00	....	20.00	....	....	....	....	....	....	....
*Pittsburgh	25.00	....	20.00	23.00	....	....	....	....	....	....
Los Angeles	25.00	....	....	....	....	....	....	....	....	....
*Chicago	25.00	....	....	....	....	24.00	....	....	....	....
Detroit	25.00	....	20.00	....	....	....	....	....	....	....
*St. Louis	25.00	21.00	20.00	23.00	....	....	17.75	27.00	22.00	17.75
Cincinnati	25.00	....	20.00	23.00	....	....	....	....	....	....
Birmingham	25.00	....	20.00	23.00	20.00	....	17.75	....	22.00	....
*Seattle	25.00	....	....	....	....	....	....	....	....	....

* Fob shipping point; † fob tracks; ‡ dealers buying prices.

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 14.37½c, del. Conn.; less carlots 14.50c, refinery. Dealers may add ¾c for 5000 lb to carload; 1c, 1000-4999 lb; 1½c, 500-999 lb; 2c, 0-499 lb. Casting, 14.12½c, refinery, 20,000 lb or more; 14.37½c, less than 20,000 lb.

Brass Ingot: 85-5-5-5 (No. 115) 15.50c; 88-10-2 (No. 215) 18.75c; 80-10-10 (No. 305) 18.25c; No. 1 yellow (No. 405) 12.50c; carlot prices, including 25c per 100 lb freight allowance; add ¼c for less than 20 tons.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis; high grade 9.25c, del., carlots. For 20,000 lb to carlots add 0.15c; 10,000-20,000 lb 0.25c; 2000-10,000 lb. 0.4c; under 2000 lb 0.50c.

Lead: Common 8.10c, chemical 8.20c, corroding, 8.20c, E. St. Louis for carlots; add 5 points for Chicago, Minneapolis- St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland - Akron - Detroit area, New Jersey, New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston - Worcester, Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lb and over; add ½c 2000-9999 lb; 1c less through 2000 lb.

Secondary Aluminum: Piston alloy (No. 122 type) 13.25c; No. 12 foundry alloy (No. 2 grade) 13.25c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1 (95-97½%) 14.50c; grade 2 (92-95%) 13.25c; grade 3 (90-92%) 12.25c; grade 4 (85-90%) 11.75c. Above prices for 30,000 lb or more; add ¼c 10,000-30,000 lb; ½c 5000-10,000 lb; ¾c 1000-5000 lb; 1¼c less than 1000 lb. Prices include freight at carload rate up to 75c per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lb) 20.50c per lb, carlots; 22.50c 100 lb to c.l. Extruded 12-in. sticks 27.50c, carlots; 29.50c 100 lb to c.l.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11.199 lb, 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05% max. arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American bulk carlots fob Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05% max.; other impurities, 0.1% max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb; ½c for 9999-224 lb; and 2c for 223 lb and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, fob refinery 35.00c lb; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c.

Mercury: Open market, spot, New York, $96-$99 per 76-lb flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be, $14.75 per lb contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms $1.25 lb, del.; anodes, balls, discs and all other special or patented shapes, $1.30.

Cobalt: 97-99%, $1.50 lb, for 550 lb (bbl.); $1.52 lb for 100 lb (case); $1.57 lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Indium: 99.9%, $2.25 per troy ounce.

Silver: Open market, N. Y. 89.00c per ounce.

Platinum: $91.50 per ounce.

Palladium: $24 per troy ounce.

Iridium: $125 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 14.37½c, Conn., for copper. Freight prepaid on 100 lb or more.)

Sheet: Copper 25.81c; yellow brass 23.67c; commercial bronze, 95% 26.14c, 90% 25.81c; red brass, 85% 24.98c, 80% 24.66c; best quality 24.38c; phosphor bronze, grade A 4% or 5%, 43.45c; Everdur, Duronze or equiv., hot rolled, 30.88c; naval brass 28.53c; manganese bronze 31.99c; muntz metal 26.78c; nickel silver 5% 32.38c.

Rods: Copper, hot rolled 22.16c, cold drawn 23.16c; yellow brass 18.53c; commercial bronze, 95% 25.83c, 90% 25.50c; red brass, 85% 24.67c; 80% 24.35c; best quality 24.07c; phosphor bronze, grade A 4% or 5% 43.70c; Everdur, Duronze or equiv. cold drawn, 29.82c; naval brass 22.59c; manganese bronze 25.93c; muntz metal 22.34c; nickel silver 5% 34.44c.

Seamless Tubing: Copper 25.85c; yellow brass 26.43c; commercial bronze 90% 28.22c; red brass 85% 27.64c, 80% 27.32c; best quality brass 26.79c; phosphor bronze, grade A 5% 44.70c.

Copper Wire: Bare, soft, fob eastern mills, carlots 19.89c, less carlots 20.39c; weatherproof, fob eastern mills carlot 22.07c, less carlots 22.57c; magnet, delivered, carlots, 23.30c, 15,000 lb or more 23.55c, less carlots 24.05c.

Aluminum Sheets and Circles: 2s and 3s flat mill finish, base 30,000 lb or more del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 11.25c; cut sheets 11.50c; pipe 9.90c, New York, 10.00c Philadelphia, Baltimore, Rochester and Buffalo, 10.50c Chicago, Cleveland, Worcester and Boston.

Zinc Products: Sheet fob mill, 13.15c, 36,000 lb and over deduct 7%. Ribbon and strip 12.25c, 3000-lb lots deduct 1%, 6000 lb 2%, 9000 lb 3%, 18,000 lb 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lb 12.50c; 100-500 lb 13.00c; under 100 lb 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

PLATING MATERIALS

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lb to 1 ton 17.75c; under 400 lb 18.25c.

Copper Anodes: In 500-lb lots, fob shipping point, freight allowed, cast oval over 15 in., 25.125c; curved, 20.375c; round oval straight, 19.375c; electro-deposited, 18.875c.

Copper Carbonate: 52-54% metallic Cu, 250 lb barrels 20.50c.

Copper Cyanide: 70-71% Cu, 100-lb kegs or bbls 34.00c, fob, Niagara Falls.

Sodium Cyanide: 96%, 200-lb drums 15.00c; 10,000-lb lots 13.00c fob Niagara Falls.

Nickel Anodes: 500-2999 lb lots; cast and rolled carbonized 47.00c; rolled depolarized 48.00c.

Nickel Chloride: 100-lb kegs or 275-lb bbls 18.00c lb, del.

Tin Anodes: 1000 lb and over 58.50c del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb bbls 39.00c, fob Grasselli, N. J.; 100-lb kegs 39.50c.

Sodium Stannate: 100 or 300-lb drums 36.50c, del.; ton lots 35.50c.

Zinc Cyanide: 100-lb kegs or bbls 33.00c fob Niagara Falls.

Scrap Metals

Brass Mill Allowances: Prices for less than 15,000 lb fob shipping point. Add ¾c for 15,000-40,000 lb; 1c for 40,000 or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	12.000	12.000	11.250
Yellow brass	9.875	9.625	9.125
Commercial bronze			
95%	11.250	11.000	10.500
90%	11.125	10.875	10.375
Red Brass			
85%	10.875	10.625	10.125
80%	10.875	10.625	10.125
Best quality (71-79%)	10.500	10.250	9.750
Muntz metal	9.250	9.000	8.500
Nickel silver, 5%	10.500	10.250	.....
Phos. br., A, B, 5%	12.750	12.500	11.500
Naval brass	9.500	9.250	8.750
Manganese bronze	9.500	9.250	8.750

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are fob shipping point; add ¾c for shipment of 60,000 lb of one group and ½c for 20,000 lb of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper and copper borings 11.50c; No. 2 copper wire and mixed heavy copper, copper tuyeres 10.50c.

(Group 2) Soft red brass and borings, aluminum bronze 10.75c; copper-nickel solids and borings 11.00c; lined car boxes, cocks and faucets 9.50c; bell metal 17.25c; babbitt-line brass bushings 14.75c.

(Group 3) Admiralty condenser tubes, brass pipe 8.75c; muntz metal condenser tubes 8.25c; old rolled brass 8.25c; manganese bronze solids; (lead 0%-0.40%) 8.00c; (lead 0.41%-1%) 7.00c; manganese bronze borings, 7.25c.

Aluminum Scrap: Price fob point of shipment, truckloads of 5000 pounds or over; Segregated solids, 2S, 3S, 5c lb, 11, 14, etc., 3 to 3.50c lb. All other high grade alloys 5c lb. Segregated borings and turnings, wrought alloys, 2, 2.50c lb. Other high-grade alloys 3.50c, 4.00c lb. Mixed plant scrap, all solids, 2, 2.50c lb borings and turnings one cent less than segregated.

Lead Scrap: Prices fob point of shipment. For soft and hard lead, including cable lead, deduct 0.75c from basing point prices for refined metal.

Zinc Scrap: New clippings 7.25c, old zinc 5.75c, fob point of shipment, add ½c for 10,000 lb or more. New die cast scrap 4.95c, radiator grilles 4.95c, add ½c for 20,000 lb or more. Unsweated zinc dross, die cast slab 5.80c, any quantity.

Nickel, Monel Scrap: Prices fob point of shipment; add ½c for 2000 lb or more of nickel or cupro-nickel shipped at one time and 20,000 lb or more of monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 23.00c per lb nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb contained nickel, plus 8.00c per lb contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; solder sheet 18.00c.

Sheets, Strip . . .

Heavy yearend carryover is inevitable as fourth quarter preference tonnage is showing increase

Sheet & Strip Prices, Page 182

New York — Every indication points to heavy carryover in sheets at the end of this year, even greater than many anticipated a short time ago. Some producers who had set up quotas for fourth quarter only later to be confronted by possibility of having to reduce them, because of the volume of rated tonnage being received, have more recently decided to do nothing about reducing quotas but rather let the tonnage that they can't handle fall into next year.

They explain that they still don't know how much rated tonnage they will have to supply over fourth quarter and that any effort now to reduce quotas so as to make the end of the year come out more evenly would be unsatisfactory and, in fact, would be a waste of time and effort. In a few cases producers did not set up quotas at all, figuring that their current arrearages, combined with what rated tonnage they would receive, would take up entire fourth quarter production. These producers, consequently, may come out at the end of the year with their order books in reasonable balance. However, they will be the exception.

Certain sheet producers estimate that they will be at least two months behind at the end of the year and possibly more, especially on hot and cold-rolled sheets and galvanized. In the case of the latter, producers are especially fearful that their carryovers will be heavy, because of shortage of zinc, which already has very definitely affected output at some mills.

On stainless steel sheets the outlook is more promising. Some producers, knowing about where they stand on fourth quarter orders, have opened books for first quarter. They are now accepting orders not only from their manufacturing customers but from jobbers as well, promising the latter the same tonnage as set up for the current quarter.

Philadelphia — Sheet producers continue to have difficulty meeting even the greater portion of demand. Due to rated tonnage for the housing program they have little to spare in galvanized for other requirements, a situation also complicated by shortage of zinc. The carryover in hot and cold-rolled sheets at the end of third quarter was somewhat less than at the end of the preceding quarter, but nevertheless was still heavy and in some specialties requirements for electrical sheets remain far in excess of capacity. Expansion in electrical sheet facilities, due originally to be increased in September, have been held back because of inability to obtain equipment, with the result that it probably will be well into first quarter before there will be any material relief in this respect. The situation in stainless steel sheets is probably easiest of all, at least to the extent that some producers have been able to gage their position accurately enough to open books for first quarter. However, there is considerable stainless moving, with increase in demand for beer kegs a feature here.

Pittsburgh — Sellers are not expected to be free from priorities and directives until the end of first quarter. In fact, it is possible that preference rating soon may be extended to cover steel shipments to the West Coast and for railroad freight car construction, while rated tonnage for export and military needs likely will be increased. Producers claim that although rated tonnage is relatively small in contrast to total output the fact that lead dates frequently are ignored and orders from other than regular customers must be accepted has caused much schedule dislocation and reduced output. Carryover into fourth quarter is unusually heavy but most producers scheduled relatively few orders for fourth quarter with the intention to clear up deferred orders if possible. Power strike here has not affected steel mills as they have their own power sources.

Chicago — Sheet and strip makers are taking some encouragement from the fact that new orders are falling significantly below the ratio of shipments to capacity. This may or may not be of lasting importance, but if it continues it may portend that production is gaining on demand. Nevertheless, it would be many months before carryovers could be reduced and shipments become current. Cancellations are virtually absent.

Boston—Fabricators of flat-rolled steel are uncertain as to the first-half supply and relatively little new tonnage is being accepted for that period on a firm basis. Mills are making disappointing progress toward reducing prospects of heavy carryovers on most grades. They are hampered by additional rated volume for fourth quarter. Until the extent of the carryover is more definitely established, first and second quarter schedules cannot be estimated. Meanwhile, consumers generally with inventories appear to recognize the mills' position more clearly, accepting the inevitable as to continuance of limited supplies over the next few months. Narrow cold-rolled strip production is disappointing and operations at consumer plants are adversely affected in more cases. Potential production of new fabricated strip products is notably retarded, especially if the prospective consumer is a new user of strip in low carbon grades. One of the few contracts against Springfield Arsenal inquiries, which have often brought no bids, has been placed. This was on a bid Sept. 12 on several hundred tons by T. J. Rafferty & Co., Worcester warehouse.

Cleveland—Increase of 3½ cents per 100 pounds in delivered prices of finished steel, including sheet and strip, at Toledo, O., Detroit, eastern Michigan, Gulf and Pacific coast basing points will restore the normal balance between these arbitrary mill basing point values and other basing point prices. The increases were authorized to permit mills to charge the same proportion of the July 1 freight increase to the consumer at the named points as they already are permitted to charge at regular basing points. Although OPA said that under the former maladjustment producers would "find it to their advantage to refrain from shipping iron and steel products into these territories," sellers state that shipments to these districts have not been curtailed due to the unsatisfactory price situation.

CC ratings for delivery of iron and steel products became valid on the first of this month, restoring the system which was in effect prior to Jan. 21. If a manufacturer can show urgent need for steel and can fulfill certain requirements, he can obtain preferential treatment. In addition, self-certified orders placed on mills for September delivery but which were carried over to October must now be treated as CC orders for the current month. Sellers of flat-rolled products report that rated orders account for as much as 25 per cent of bookings for October on some products. Priorities are especially heavy for cold-rolled, galvanized, and enameling sheets. This is expected to become an increasingly serious problem with mills in arranging schedules. So far CC ratings have been authorized chiefly under the veterans' housing program but railroads are expected to be granted preferential treatment soon, which will further complicate the mills' problem of making an equitable distribution of their output.

Cincinnati — Schedules of district sheet mills are still being upset by inroads by rated orders. Hence there is an uncertainty as to how nonrated consumers will fare during fourth quarter. Although first quarter books have not been opened, it appears certain the supply will be no easier. A recheck disclosed carryover from third quarter not as heavy as in earlier estimates. Production continues high.

St. Louis — Sheet production is on the increase although hampered by a shortage of bricklayers needed for maintenance on some open hearths, soaking pits and slab furnaces. Continuing refusal of new orders is enabling mills to pick up ground on backlogs. Books are filled now through first half and will not be reopened until January or February. September output was 60 per cent of capacity and October and November are slated for 80 and 100 per cent, respectively. Two of the three new open hearths Granite City Steel Co. leased from DPC are on, and the third is to start operation in October. Mills hope to be on top of their orders by the end of June. Pressure for sheets continues to increase. Sheets lighter than 18 gage are in especially great demand.

Birmingham — Sheets are tightest of all specifications in steel in this district. Not only is demand phenomenal from regular sources for such staple items as roofing, but processing sheets are a cause of more than ordinary concern with apparently no end to demand. Mills are working at capacity with a little switching of ingots evident here and there, but no end to the current squeeze is immediately apparent.

Semifinished Steel . . .

Semifinished Prices, Page 182

Cleveland — Prices of semifinished steel, including ingots, blooms, billets, slabs, and sheet bars, have been increased, effective Oct. 9, 50 cents per gross ton at Toledo, O., Detroit, eastern Michigan, Gulf and Pacific Coast basing points. This action was taken by OPA to permit sellers to charge the same proportion of the July 1 freight increase to the consumer at the named points as they are already permitted to charge under the basing point system where the consumer bears all freight increases from the basing point to delivery point.

Steel Bars . . .

First quarter books open for alloy and cold-drawn bars but delayed on hot carbon material

Bar Prices, Page 182

Pittsburgh — Bar mill production held at practical capacity last week in spite of complete shutdown of public transportation because of the electric utility strike. Sellers are not expected to open books officially for first quarter until more accurate estimates of yearend carryover can be made. Most producers find third quarter carryover is two to three months. Anticipating this situation many sellers scheduled relatively few orders for fourth quarter shipment. However, production in third quarter was not up to expectations, with the result that most producers believe the yearend carryover will absorb all January output. Considerable tonnage for export is in the offing for fourth quarter, in addition to that already scheduled for European countries. If approved, this directive tonnage will further dislocate production schedules for domestic account.

New York — While hot carbon bar producers are under heavy pressure from buyers for commitments on first quarter tonnage, they, in general, still have not formally opened books. They explain that they are far behind on commitments and still are not able to gage accurately what they are going to be able to produce over the remainder of this year. However, some business is being taken, and it would not be surprising if some of larger sellers will take general action soon. Already books have been opened for first quarter on alloy bars and cold-drawn carbon bars. The greatest scarcity continues in small sizes of hot carbon bars, anything, in fact, under 1½ inches. Railroad equipment builders are driving hard for tonnage for new construction and repairs, tonnage required for this year.

St. Louis — Production of merchant bars remains high but is losing ground to demand. Bar mills are having increasing trouble getting pig iron, coke and scrap, although no shutdowns are in sight yet. Because all but essential new orders are being rejected, some progress on the backlog is being made. Bar deliveries on the average are six to seven months late. All new business is on a mill convenience basis. Attempts are being made to reduce export tonnage and a substantial order from France for railroad and dock reconstruction work was turned down recently.

Seattle — Demand for bars continues at a peak but mills are refusing much business, striving to reduce current backlogs. Books for 1947 will not be opened until later. One plant here recently refused 2000 tons, 1200 of which were from warehouses. It will probably be well into next year before present commitments are delivered. A large tonnage is required for reclamation projects but this is affected by the freezing order. In many instances contractors are unable to bid because they cannot obtain materials. Mill production is affected by labor turnover and inefficiency.

Philadelphia — Producers of hot carbon bars continue far behind on commitments for smaller sizes and when they open books to the general trade for first quarter it is likely they will be fully sold out for the period. Some producers, in fact, probably will be sold out for well beyond that. As some producers already have formally opened books beyond Dec. 31 on cold-drawn carbon bars and hot and cold alloys, commitments for first quarter are expanding. With agricultural equipment manufacturers no longer favored by preferences, relatively little rated tonnage is being booked for this industry.

Cleveland — Deliveries of bars are being made this month on "CC" ratings for the first time since Jan. 21 when the system was suspended. These orders account for only a small proportion of total bookings and have not caused any major revisions in schedules. The increase of 3½ cents per 100 pounds in delivered prices, effective Oct. 9, at Toledo, O., eastern Michigan, Gulf and Pacific coast basing points will not result in any increase in shipments to those territories since they have been as large as production would permit. Carbon bar bookings increased last month over August, although producers have not formally accepted them or attempted to make delivery promises with large sizes in fairly free supply. Some consumers have switched to alloy specifications in order to get prompter delivery but others have hesitated to do so because of the substantially higher costs.

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Steel Plates . . .

Output far below needs as scrap shortage limits steel; light gages most delayed, well into next year

Plate Prices, Page 183

New York — With plate producers still unable to operate at capacity, for any one of several reasons, principally because of shortage of scrap, consumers report increasing difficulty in getting shipments. In some cases they report that suppliers are weeks behind on current promises and see no early signs of improvement. Light plate is especially scarce, as it has been throughout the greater part of this year.

However, buyers have less difficulty getting orders placed for next year for plates than for other major products. Various mills, although not all, are accepting orders for first quarter and beyond. One independent has capacity fully scheduled for first half. Demand from car shops is more active than in considerable time, due not only to increasing equipment orders being placed but to urgency for getting out work on books and for making needed repairs.

Boston — Volume of plate orders being placed is limited, with most mills sold through the year, confronted with high but uncertain carryovers and with many unentered orders still to be submitted to mills for scheduling. With carryover and orders awaiting space producers are in second quarter. Until extent of carryovers is known most are practically out of the market. Notably difficult is placement of tank steel, a grade affected by selectivity in acceptance of orders for some months. As a result backlogs in this grade are concentrated heavily, with two producers taking orders to the limit of their ability.

Cleveland — Price increase of 3½c per 100 pounds at Toledo, O., Detroit, eastern Michigan, Gulf and Pacific Coast ports will become effective Oct. 9 on plates. Sellers point out that this will not result in any increase in the proportion of total output that is being shipped into these territories because price considerations have not been a factor in determining allocations of the supply. CC ratings became valid Oct. 1 but have been applied to only a few orders in this district. Sellers have not opened books for 1947 and when they do April generally will be the earliest position.

Philadelphia — Shortage of scrap and pig iron, particularly the former, continues to handicap eastern plate producers. In no case is production at normal and in some cases well below. Last month one producer turned out about 30 per cent of what he ordinarily would, because of difficulty in getting raw materials. This situation has made it difficult, if not impossible, for most plate producers to make progress on current commitments and this, combined with future commitments, has built backlogs extending into second quarter, even on the basis of normal production. With orders so far advanced and with West Coast production being increased there may be some cancellations or adjustments affecting later schedules but so far there have been few such developments, according to district mills. One plate producer whose operations have been hit by pig iron and scrap shortage, although not the hardest hit, claims that if he were to get back to normal production he could roll present commitments in seven months, but that if he were forced to continue at the present rate of output rolling of orders on books would require almost a year.

Seattle — Bids were opened here Oct. 3 for the Bow Lake pipe line, requiring 36,695 feet of 30 to 72-inch steel water pipe, totaling 5000 tons, with alternate bids on concrete pipe. Oregon Culvert & Pipe Co., Portland, Oreg., is low at $14,790 to the forest service for 5760 feet of corrugated metal culvert pipe.

Wire . . .

Wire Prices, Page 183

Pittsburgh — Many consumers of wire are attempting to get on mill books for first quarter delivery, with little success, as producers first must have a clear indication of carryover into next year. On many manufacturers and merchant wire items this tonnage is expected to absorb more than half of first quarter output. Estimated 1947 nail requirements of 835,000 tons will necessitate further increase in production to about 70,000 tons monthly. Present monthly output is estimated at 66,000 tons. In the effort to increase nail production CPA is said to be considering an incentive premium payment plan applicable to all tonnage over the established quota.

Boston — Overall prospects for an im-

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proved supply of rods has not improved, although some users currently have slightly larger stocks, due to mild, temporary improvement in deliveries against old orders. Demand for drawn wire is unabated and slight inroads are being made on backlogs, although integrated mills manage to maintain a high rate of ingot production. Cable works have an improved supply of copper but shortages in other components handicap heavier production. Output centers heavily in high-carbon. Users of low-carbon stocks are in need of wire. Screw and small fastener producers are pressing for more rods and wire.

Structural Shapes . . .

Structural bookings and shipments show increase in spite of restrictions by CPA on nonhousing

Structural Shape Prices, Page 183

New York — August bookings, according to the American Institute of Steel Construction, amounts to 161,567 tons, compared with a revised total for July of 135,502 tons. The total for the first eight months was 1,264,435 tons, against an average of 956,887 tons for the five prewar years, 1936-1940, an increase of 32.1 per cent. August shipments totaled 145,137 tons, the largest for any month reported this year, and brought the total for the first eight months to 924,953 tons, against an average of 936,890 for the five prewar years. Tonnage available for fabrication within the remaining four months this year was reported at 651,461 tons, against 350,517, the average for the five prewar years.

Philadelphia — Heavy structural work continues to lag because of CPA restrictions. Not only are new inquiries and orders definitely down from a few weeks ago but some orders already placed are being held up at least temporarily. Furthermore increased costs, particularly in labor, are holding up work exempt under CPA regulations, public work especially. On the other hand some work is going ahead, including 600 tons for four Bell telephone buildings in Philadelphia and vicinity, placed with Bethlehem Steel Co., Bethlehem, Pa., and 300 tons for a state bridge at Clifton, N. J., placed with American Bridge Co., Pittsburgh. The latter fabricator is understood to have booked 1900 tons for a power station at Warren, Pa., on which Gilbert Associates, Reading, Pa., are engineers. CPA district office for the period Sept. 20-26 approved 30 projects, valued at $600,327, and denied projects valued at $1,326,464. Fabricators and shape mills, however, still have substantial backlogs, running well into next year.

Seattle — CPA restraint on building is felt deeply in this area, resulting in decreased inquiry for steel and other materials, especially in the case of small plants. Much steel already placed is afloat, delayed by the seamen's strike. Some small jobs, under 75 tons, are being accepted but completion is uncertain.

Boston — Most fabricated structural steel contracts being placed here are for projects outside this district. New inquiry is light and with placement of the few contracts now pending active tonnage will be substantially reduced, although some contracts have been canceled and others postponed. These are scattered about the country. E. B. Badger Co., Cambridge, Mass., requires a large tonnage for a refinery at Baytown, Tex. Although inquiry has declined and is being reflected in fabricating shops, mills have not experienced any letdown or easing yet.

Chicago — Fabricators are pressing mills hard for standard structural shapes. They have much work in progress and jobs become held up for lack of sufficient material or sizes to maintain schedules. Inventories of shapes are low and unbalanced. Mills have a bottleneck in their smaller shape mills, demand for the output far exceeding capacity. The situation is further complicated by having insufficient semifinished steel to allocate to the various structural mills. The excessive demand for flat-rolled products, such as sheets, has operated to the detriment of structural steel.

Tubular Goods . . .

Tubular Goods Prices, Page 183

Pittsburgh — Pig iron shortage continues to restrict production of cast iron pipe and this has held up a number of municipal projects, while others have been dropped, at least temporarily. Limited production of tube rounds and skelp prevent full operation among nonintegrated interests and there is little indication of much improvement in supply before the end of the year. Exception-

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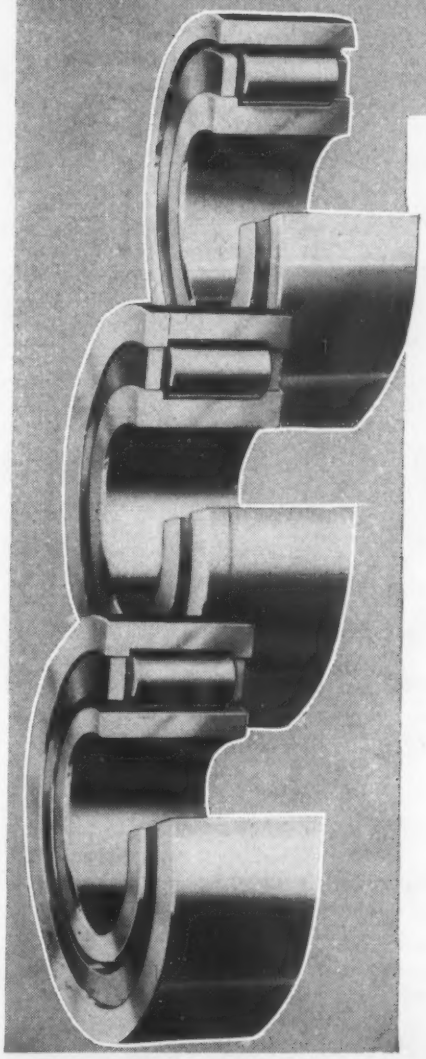

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ally heavy demand is expected to keep steel pipe inventories of distributors well below normal, although mill pipe production currently is unusually high. Producers are booked solidly through the remainder of the year on small diameter light-wall tubing, with late December available on larger sizes. Unusually heavy tubing demand is noted from automotive and railroad industries. Producers do not expect much interruption to production from CC rated tonnage this quarter.

Pig Iron . . .

Supply still short, demand heavy, with incentive plan not yet showing effect; coke supply inadequate

Pig Iron Prices, Page 185

New York — Preference tonnage for October will amount to about the same as for September as far as this district is concerned. At least that is the opinion of some leading pig iron sellers. It is still too early to gage the effect of the price incentive program this month on foundry and malleable iron production; however, it should result in some improvement.

One complication, though, is scarcity of coke. This may become even more pronounced because of increasing production of foundry and malleable iron, which requires a greater percentage of coke than basic iron.

Melt in this district in September was down appreciably from the preceding month, due primarily to strikes of truckers and salt water seamen. Brooklyn foundries were particularly handicapped. However, while there are still some labor disorders among the truckers and new strikes have developed along the water front, the general opinion is that these disruptions will be ironed out fairly soon and will not have the bearing on foundry production this month that they did in September.

Pittsburgh — Inadequate electric power, developing from the strike of electric utility employees, has forced many foundries to curtail operations, due to inability to operate certain equipment. Some foundry interests hope to accumulate some pig iron in the interval, as well as coke and cast scrap. The local merchant blast furnace expects little change in volume of rated orders for October, in spite of removal of agricultural implement manufacturers from the preferred category. Critical shortage of scrap has forced nearly all foundries to increase proportion of pig iron in their mixtures, which adds to the general tightness in pig iron.

Cincinnati—Supplies of pig iron to foundries in this district continue on the September level which, in the lack of easy scrap, held down the melt on unrated castings. Dependent on other districts for foundry iron, melters here are unable to predict what effect, if any, the premium price plan will have on allotments.

Boston — For the next two months at least no easing in pig iron is in sight, with an increasing number of foundries confronted by stoppages, due to lack of iron. Included is one large machine tool builder and one textile mill equipment builder. The latter is also affected by shortages at ten foundries supplying castings under subcontracts. October schedules are being lined up after delays because of extensions of acceptance of rated tonnage until Oct. 5.

Although under pressure, Mystic furnace, which goes into blast Nov. 15, is not accepting firm orders until the volume of rated orders on that producer is established. First production will be spread thinly and ore supply will have to be increased if the stack is to continue in blast more than three months. Shortage of castings is opening the field for weldments and stampings in several industries forced to improvise.

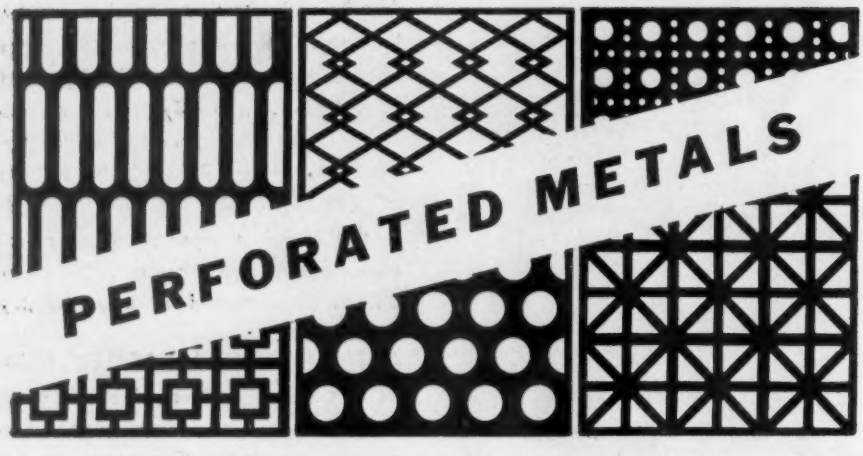
Philadelphia—Pending final word Oct. 5 as to what they would be called on in preference tonnage to supply in October, district pig iron sellers have started shipments on the basis of last month's distribution. Production of foundry and malleable iron is expected to show some improvement as a result of the price incentive program and while rated consumers will get what they need, output will still fall far short of what nonrated foundries would like to have.

However, fast becoming a greater obstacle than even pig iron itself is coke. With rated consumers increasing their needs for coke, 200 to 300 per cent in some cases, as compared with a year ago, and even more, district by-product producers are fairly swamped. The situation has been made particularly critical as producers have little or no stocks on which to rely. Efforts of eastern seaboard consumers to obtain beehive coke from western Pennsylvania have been largely unsuccessful so far. Also adding to the scarcity is the expanding production of foundry iron, which requires a greater quantity of coke.

Buffalo—Although pig iron output has reached levels attained during the war, producers are falling far short of filling pressing demands of foundries. The trade was surprised this week by the arrival of a boat with 5000 tons of pig iron from the Detroit section, presumably for a local automotive caster. Producers continue to search for coke and ore supplies to maintain present operating schedule. There is a possibility that one furnace may be shut down soon because of the coke problem.

Chicago — Foundries, loaded with orders for castings, are caught firmly between the shortages of both pig iron and cast scrap. Most are operating hand-to-mouth on both. More than normal iron has to be used to offset lack of scrap. Of the district's 41 blast furnaces, 37 are operating, but only a fraction of the output goes into merchant iron, most being required for steelmaking. Foundries making items for housing are hoping WAA accepts Inland Steel Co.'s bid for the DPC blast furnace plant, as it would provide between 20,000 and 24,000 tons of merchant iron per month to be applied to the housing program. Some announcement on the sale is expected before Oct. 9 when Inland's lease on the plant expires.

St. Louis — Pig iron production remains at capacity. Operations for some time have been limited to basic iron, hence the effect of the premium production plan has not been felt. Large users



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have sufficient supplies although there are virtually no ground stocks. Shipments from outside have been hampered somewhat by production delays and car shortages. Any further drop, it is reported, will endanger local supplies seriously.

Birmingham — Pig iron scarcities continue to trouble merchant iron melters. Demand seems without end and in unpredictable quantities, especially from foundries and scattered industrial plants. Best estimates are that an additional 50 per cent iron is needed in this terrtory.

Scrap . . .

Little gain in shipments as collectors find profit narrow; consumers search widely for supply

Scrap Prices, Page 186

Pittsburgh — Additional steel producers have obtained approval to buy electric furnace scrap grades for open-hearth use. In an effort to balance consumer scrap inventory CPA is expected soon to issue regulations limiting consumer cast scrap stocks to 30 days supply and 45 days for other grades. It was earlier expected that scrap dealers would have to balance collections with shipments to consumers but this has not materialized and dealers are free to accumulate scrap. Steelmakers continue to rely heavily on dwindling scrap inventories with most scrap originating directly from fabricators, resulting in considerable cross hauling while railroad cars are scarce. Mills claim there is no alternative. Government scrap drive collections are gaining momentum. OPA has agreed to put up for consideration at the next industry advisory committee meeting the request of a group of electric furnace and acid open hearth operators here that billet, bloom and forge crop scrap be restored as a separate listing at a differential of $5 per ton.

Chicago — Although flow of scrap is at a slightly higher level than before OPA announced its price decision, it continues far below demand. Roughly the supply is about equal to current consumption. Demand is at its high level because mills are trying strenuously to improve inventories, now disturbingly low since winter weather is not far away. There appears to be little hope of stocking much material until industrial production generates more tonnage, and this is dependent upon a better flow of finished steel from mills. Carnegie-Illinois Steel Corp. has received government approval to acquire and use 25,000 tons of electric furnace steel in its Gary open hearths; request to make similar use of 15,000 tons at South Works so far has netted approval for 7500 tons. Inland Steel Co. was granted similar approval for an unstated tonnage. Cast scrap is now as tight as before OPA granted ceiling price increase; price apparently being unable to improve volume except immediately after the advance.

Cincinnati — All melters are pressing for heavier scrap shipments, loudest appeals being for cast. Brokers and dealers have scoured sources of cast scrap but have had only moderate success in bringing out additional tonnage. Others besides foundries are hard put for adequate scrap as middle interests allot supplies as best they can to meet most urgent needs. The market has noted slight, if any, gain recently in production scrap.

Philadelphia — Little improvement is noted in scrap and in spite of possibility of stiffer controls on inventories, as discussed recently by the CPA steel scrap advisory committee in Washington, the outlook is still poor, as viewed by most trade leaders. Meanwhile, district operations continue restricted by lack of scrap. The Philadelphia Navy Yard recently sold 4000 tons of unprepared scrap, 2000 tons of mild steel going at the ceiling of $14.01 and 2000 tons of alloy scrap at $15.75. Some eastern consumers have been permitted by Washington to buy low phos scrap for basic open hearth use. They assert, however, that as they are insisting on the material being up to specifications they are not getting much relief.

Cleveland—Little relief is apparent in the steel and iron scrap situation, collectors and yards apparently being apathetic in view of their feeling that the margin of profit is too small under present regulations to cause effort on their part. As a result shortage continues and melters are cutting into reserves or operating on daily receipts. Lack of scrap is made up by larger proportion of pig iron, further reducing supply of the latter for other users. Low phos grades continue to be taken for open hearths, un-

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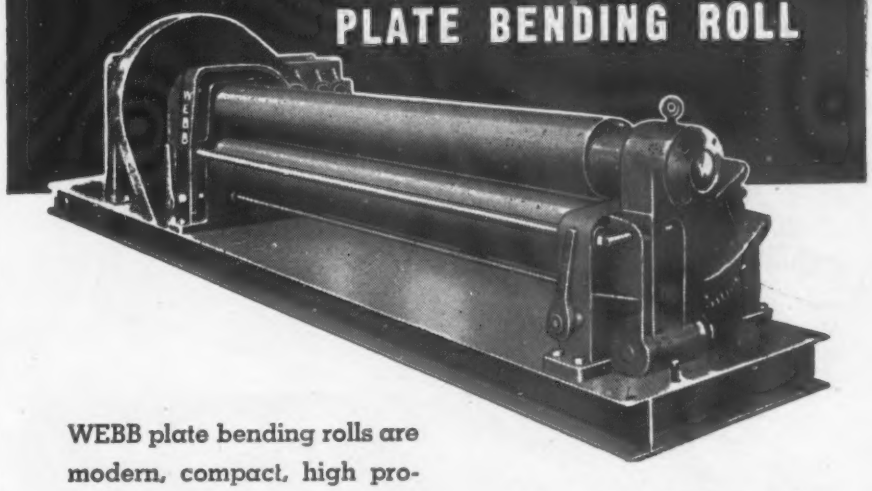

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der government permission. Cast scrap is in somewhat better supply but still is far short of needs.

Boston — Movement of steel and cast scrap continues limited and some dealers are reluctant to release tonnage of the former at current prices. Cast supply is limited and in some cases low phos is going to open hearths. Foundries are melting a high ratio of scrap with the percentage as high as 90 to 100 per cent in some cases, including the valve foundry in the Springfield district. Shortage of pig iron accounts for this, but the high scrap ratio in melts intensifies the pressure on the limited supply being released.

New York — Scrap shipments still fall far short of requirements, this even applying to cast grades, on which some price relief was granted recently. One fundamental difficulty with cast scrap is that so little is being produced. Meanwhile, upgrading of scrap on a large scale is being reported.

Birmingham — Scrap is piling up on local yards. Not a great deal of it, according to reports, is of the most desirable grade, but it is not moving except in negligible amounts. Processing has been hampered by labor shortage and bad weather, although steelmaking has not yet actually suffered a setback on that account.

Warehouse . . .

Warehouse Prices, Page 184

Philadelphia — Having experienced one of the best months of the year in September, Philadelphia jobbers differ in appraisal of the outlook for the remainder of the year. Much depends on ability to obtain steel for mills, and while some believe incoming shipments will decline, now that preferences under Direction 13 have lapsed, others believe shipments in general will be maintained, if not actually increased. The latter admit, however, that this may not be true with regard to some of the more critical items, such as sheets and small carbon bars. They are not certain about light shapes, either.

Pittsburgh — Steel distributors expect substantial reduction in mill shipments this quarter, with expiration of Direction 12, under which steel producers shipped warehouses not less than the same proportion of total tonnage produced in third quarter as in fourth quarter of 1945. Demand for warehouse steel remains well above ability of distributors to satisfy. In spite of slightly improved mill shipments in August and September warehouse inventories are well below normal and unbalanced, particularly in sheets, plates, small bars and most structural items. Distributors cannot use customers' CC ratings as a basis for obtaining steel from mill. However, this type tonnage has been relatively light so far.

Boston — Inventories of distributors for fourth quarter are less than in third quarter, although tonnage from mills during the directive period was slightly heavier. Distributors, however, were unable to build up stocks, most steel moving out promptly against new and back orders. Prospects for the final quarter are not bright for mill shipments after lapse of the directive, some producers having advised that less steel will be forthcoming to warehouses. Coverage for 1947 is limited, due to reluctance of most mills to take on firm orders for that period on many products.

Iron Ore . . .

Iron Ore Prices, Page 184

Iron ore movement from the Lake Superior region dropped in September to 9,636,353 gross tons, a a decline of 906,746 tons from September, 1945, or 8.60 per cent. For the season to Oct. 1 this year movement totaled 43,259,634 tons, a decrease of 18,412,137 tons, or 29.86 per cent. Unless weather conditions the remainder of the navigation season are favorable to vessel operations on the lakes stocks of ore for the winter are likely to be somewhat short of meeting demand at the present rate of operations.

Details of September movement are as follows:

	Sept. 1946	Sept. 1945
Escanaba	529,021	548,007
Marquette	377,940	579,425
Ashland	469 981	583,687
Superior	3,229,992	3,493,586
Duluth	2,698,369	2,818,839
Two Harbors	2,113,546	2,447,962
Total, U. S. Ports	9,418.849	10,471,506
Michipicoten	64.249	43,744
Port Arthur	153,255	27,849
Total Canada	217,504	71,593
Grand Total	9,636,353	10,543,099

Decrease 906,746 tons, 8.60 per cent.

Movement from the several ports to Oct. 1 is as follows:

	To Oct. 1, 1946	To Oct. 1, 1945
Escanaba	2,167,382	3,723,090
Marquette	1,729,191	3,025,722
Ashland	2,615,422	3,520,004
Superior	13,731,577	19,988,403
Duluth	11,858,880	16,426,092
Two Harbors	10,224,935	14,568,007
Total U. S. Ports	42,327,387	61,251,318
Michipicoten	349,951	344,316
Port Arthur	482,296	76,137
Total Canada	832,247	420,453
Grand Total	43,259,634	61,671,771

Decrease 18,412,137 tons, 29.86 per cent.

Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 183

New York — Bolt and nut manufacturers are estimated to have backlogs ranging from four to six months, and are constantly turning down business because of inability to operate at capacity. Makers declare they not only have difficulty getting steel, but also have trouble in obtaining manpower.

Principal demand is for industrial assembly work, as differentiated from railroad requirements. Jobber demands are second in importance, with stocks at most distributing plants low and unbalanced. Railroad requirements perhaps fall third, and here there is special pressure on bolt and nut makers, as builders of car equipment are fully cognizant of the letters that have gone out from Washington requesting suppliers to direct particular attention to their needs.

The greatest difficulty in obtaining steel lies in small sizes. Hot carbon bar producers report that their 8 and 10-inch mills are heavily overloaded; thus they are far behind on promises and are

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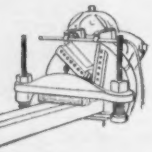

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wary about accepting new commitments. As a matter of fact, hot carbon bar producers generally have not formally opened books for next year and are accepting little new business even informally.

Higher Simanal Prices Posted for Fourth Quarter

Ohio Ferro-Alloys Corp., Canton, O., has posted increased prices for fourth quarter for silicon-manganese-aluminum ferroalloy, or simanal. Following are prices per pound of alloy, fob works, with freight allowed to destination, except to those points taking a freight rate in excess of the St. Louis rate; to such points the equivalent of the St. Louis rate will be allowed: Carload, bulk, 8.50c for lump, 2-inch and 1-inch material; 8.75c for ¼ and ½-inch size; 9.25c for 8 and 20 mesh. Prices for packed material (50 gallon barrels) are: Carload 9.00c for lump, 2-inch and 1-inch material; 9.25c for ¼ and ½-inch; 9.50c for 8 and 20 mesh; ton lots, 9.25c for lump 2-inch anl 1-inch; 9.75c for ¼ and ½-inch; 10.00c for 8 and 20 mesh; less than ton lots. 9.75c for lump, 2-inch and 1-inch; 10.25c for ¼-inch and ½-inch; 10.50c for 8 and 20 mesh. An extra charge of ½-cent is made for 30-gallon barrels.

Mines Bureau Reports on Drop in Scrap Supplies

Supply of iron and steel scrap and pig iron became increasingly short during June, according to the latest figures released by the Bureau of Mines. Reported stocks of scrap in dealers' yards decreased from 512,000 gross tons on May 31 to 425,000 tons at the end of June. Moreover, 67 per cent of the stocks were unprepared scrap on June 30 compared with 59 per cent at the end of May, indicating an additional deterioration in the scrap situation. Stocks of No. 2 heavy melting steel dropped from 101,000 tons on May 31 to 39,000 tons on June 30.

Shipments to consumers by dealers decreased 16 per cent from May and total receipts by consumers decreased slighty despite a 12 per cent increase in total use of purchased scrap during June. Stocks of scrap at consumers' plants were estimated at 3,670,000 tons on June 30 compared with 3,911,000 tons at the end of May.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

900 tons, heavy naval equipment for Pocatello, Idaho, depot, to Schmitt Steel Co., Portland, Oreg.

500 tons plus, material for steel warehouse, Grand Coulee, to American Bridge Co., Pittsburgh.

357 tons, sheet piling, boiler house, Milwaukee, for Joseph Schlitz Brewing Co., to Carnegie-Illinois Steel Corp., Chicago; Edward E. Gillen Co., Milwaukee, contractor.

300 tons, spring steel storage building, Chicago Heights, Ill., for American Locomotive Co., to Wendnagel & Co., Chicago; Sumner S. Sollitt & Co., Chicago, contractor.

200 tons, plant expansion and alterations, Ottawa, Ill., for Bakelite Corp., to American Bridge Co., Pittsburgh; F. J. McGraw Co., New York, contractor.

125 tons, bus garage, International Railway Co., Buffalo, to Bethlehem Steel Co., Lackawanna, N. Y.; George W. Walker & Sons Inc., Buffalo, general contractor.

STRUCTURAL STEEL PENDING

4935 tons, steel girder superstructure with swing span and machinery, South Capitol street bridge, Anacostia river, District of Columbia; bids Oct. 31, to district commissioners.

155 tons, also 55 tons reinforcing, bridge Boise county, Idaho; bids soon to Public Roads Administration, Portland, Oreg.

Unstated, $750,000 hangar for United Air Lines, Seattle; plans in preparation by Austin Co., Seattle.

Unstated, state highway bridge Willamette river, near Eugene, Oreg., estimated at $527,000; bids soon.

REINFORCING BARS . . .

REINFORCING BARS PLACED

2000 tons, rolling mill, Bettendorf, Iowa, for Aluminum Co. of America, to Carnegie-Illinois Steel Corp., Chicago; Walsh Construction Co., Davenport, Iowa, contractor.

REINFORCING BARS PENDING

100 tons, warehouse and plant, Chicago, for New Century Co.; bids Oct. 1.

100 tons, addition, Spring Valley, Ill., for St. Margaret's hospital; bids Oct. 4.

100 tons, also 50 tons shapes, public roads project in Oregon; E. W. Elliott, Seattle, low, $133,788.

PLATES . . .

PLATES PLACED

700 tons, reconstruction of blast furnace No. 4, Gary, Ind., for Carnegie-Illinois Steel Corp., to John Mohr & Sons, Chicago.

PLATES PENDING

5,000 tons, 36,695 feet, 30 to 72-in. water line, Bow Lake project, Seattle; bids Oct. 3; alternate concrete pipe.

PIPE . . .

CAST IRON PIPE PENDING

Unstated, $21,000 project, 27th. Ave N. E., Seattle; funds allocated; bids soon.

RAILS, CARS . . .

RAILROAD CARS PLACED

Atlanta & West Point, 50 fifty-ton box cars, to Pullman-Standard Car Mfg. Co., Chicago; work will be done at the Birmingham, Ala., shops.

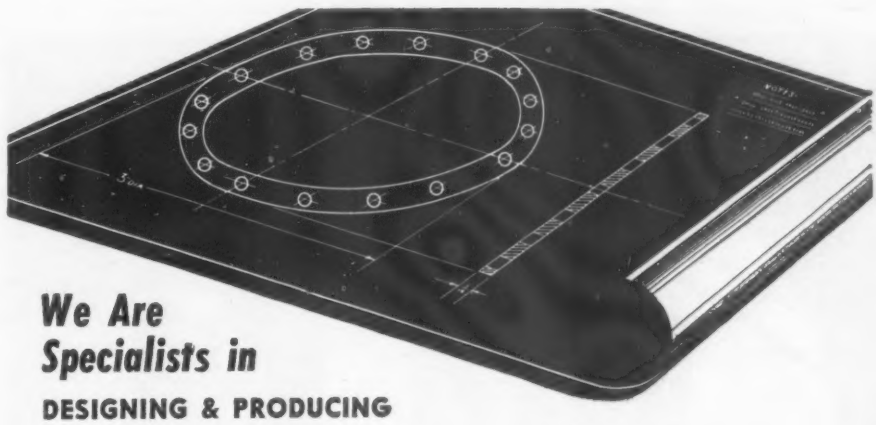
Detroit, Toledo and Shore Line, 50 seventy-ton covered hoppers, to Greenville Steel Car Co., Greenville, Pa.

The Georgia, 50 fifty-ton box cars, to Pullman-Standard Car Mfg. Co., Chicago; construction at the Birmingham, Ala., shops.

Gulf, Mobile & Ohio, 420 fifty-ton box cars and 80 fifty-ton automobile cars, to American Car & Foundry Co., New York.

Southern Pacific, 1000 forty-ton box cars, to Pullman-Standard Mfg. Co., Chicago.

Western Pacific, 250 forty-ton box cars, to Mt. Vernon Car Mfg. Co., division of Pressed Steel Car Co., Mt. Vernon, Ill.



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RAILROAD CARS PENDING

New York City Board of Transportation, 100 to 400 subway cars; American Car & Foundry Co., New York, low bidder; also 100 to 200 trolley coaches, bids Oct. 7, previously bid in May.

Railway Express Agency, 500 refrigerator express cars; new specifications being issued in place of those recently figured.

LOCOMOTIVES PLACED

Seaboard Airline, thirteen 3000-horsepower diesel-electric locomotives, to Baldwin Locomotive Works, Eddystone, Pa.

Texas & Pacific, seven 1000-horsepower diesel-electric switch engines, to Electro-Motive Division of General Motors Corp., La Grange, Ill.

Chicago, Indianapolis & Louisville, one 1500-horsepower diesel electric switcher, to American Locomotive Works, New York and another to Fairbanks Morse & Co., Chicago.

Iron and Steel Engineers Envision Prosperity Ahead

(*Concluded from Page* 83)

cost of producing pig iron should not be seriously affected, Mr. Davis contended.

As evidence of the accuracy of this statement, it is well known that Bethlehem Steel Co. and the Youngstown Sheet & Tube Co., through their operating agent, Pickands Mather & Co., have acquired large areas of taconite on the Mesabi range and have a laboratory and test plant operating near Hibbing, Minn., concentrating large samples which they are mining from the properties they have acquired. This work has been in progress for the past 5 years and these companies feel the expenditures they are making are justified. Oglebay Norton & Co. are doing the same type of work in co-operation with the American Rolling Mill Co. and the Wheeling Steel Corp.

Whether or not the next few years will bring the erection of large taconite plants on the Mesabi remain to be seen, but some of the steel companies feel that such a development is distantly possible. If this development comes, Mr. Davis explained, we will have an almost inexhaustible supply of high-grade iron ore available within the borders of our country. The Mesabi range, in his opinion, will actually become a manufacturing district rather than a straight mining district because this taconite industry must be looked upon as one that actually manufactures high-grade ore from worthless rock.

In conclusion Mr. Davis said these are interesting times in the iron ore industry and decisions of great importance are being made, but it appears certain that the future ore supply of our northern steel industry will come either from abroad or from the Lake Superior taconites.

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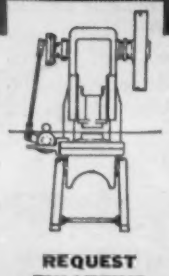

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CONSTRUCTION AND ENTERPRISE

ARKANSAS

EL DORADO, ARK.—Lion Oil Co. is building three ammonia oxidation units at its plant here for production of nitric acid, to cost about $750,000.

CALIFORNIA

BURBANK, CALIF.—Calvin & Clement, 407 South Grammercy St., Los Angeles, has building permit for a machine shop at 1100 West Magnolia Blvd., 35 x 80 feet, to cost about $13,500.

LOS ANGELES—Apex Steel Corp. Ltd., 6111 South Eastern Ave., will build a plant 118 x 260 feet and office building 70 x 125 feet, to cost about $100,000. A. C. Martin, 333 South Beaudry St., is architect.

LOS ANGELES—Steamaster Automatic Boiler Co., 5819 Compton Ave., has let contract to Economy Steel Co., 9901 South Alameda Ave., for a 68 x 260-foot traveling craneway, to cost about $55,000.

MONROVIA, CALIF.—Pan American Trailer Co., 974 South Fair Oaks St., will build a 60 x 750-foot plant at 1700 Shamrock St., to cost about $90,000. G. F. Smith, 3806 Beverly Blvd., Los Angeles, is architect.

POMONA, CALIF.—Pomona Machine Works, 163 South Commercial St., has permit for construction of a machine shop 40 x 80 feet, to cost about $14,400.

SOUTH GATE, CALIF.—Familian Pipe & Supply Co., 9430 Rayo Ave., has building permit for plant addition to cost about $13,000.

SOUTH GATE, CALIF.—Aircraft X-Ray Laboratory, 1600 East Seventh St., Los Angeles, has building permit for X-ray laboratory here at 11031 Garfield Ave., to cost about $22,000.

CONNECTICUT

NEW BRITAIN, CONN.—New Britain Machine Co., 140 Chestnut St., has let contract to Hasson & Downes, 55 West Main St., for a one-story plant addition, to cost about $140,000

WATERBURY, CONN.—Scoville Mfg. Co., 99 Mill St., has let contract to Stone & Webster Engineering Corp., 49 Federal St., Boston, for a foundry building to cost about $650,000. H. L. Thompson, 99 Mill St., is architect.

WEST HAVEN, CONN.—Churchward & Co. Inc., 37 Water St., will build one and two-story welding plant additions, to cost about $75,000.

ILLINOIS

TUSCOLA, ILL.—Panhandle Eastern Pipe Line Co. has let contract for 26 miles of 26-inch crude oil pipe line in this vicinity to Midwestern Construction Co. Sunray, Tex., to cost an estimated $1,100.000.

IOWA

IDA GROVE, IOWA—Ida County Rural Electric Co-Operative, Ida Grove, is building 44 miles of electric transmission lines, estimated to cost about $60.000.

MASSACHUSETTS

BOSTON, MASS.—Commonwealth of Massachusetts, 20 Somerset St., has let contract to V Barletta Co., 10 Whipple Ave., Roslindale, Mass., for a sewage treatment plant on Nut island, to cost $1,179.736.

PITTSFIELD, MASS.—Department of public works has let contract to N. Benenuti & Sons, 16 Elm St., New London, Mass., for a refuse incinerator, to cost about $180,000.

MICHIGAN

DETROIT—Brass-Craft Mfg. Co. Inc., 2221

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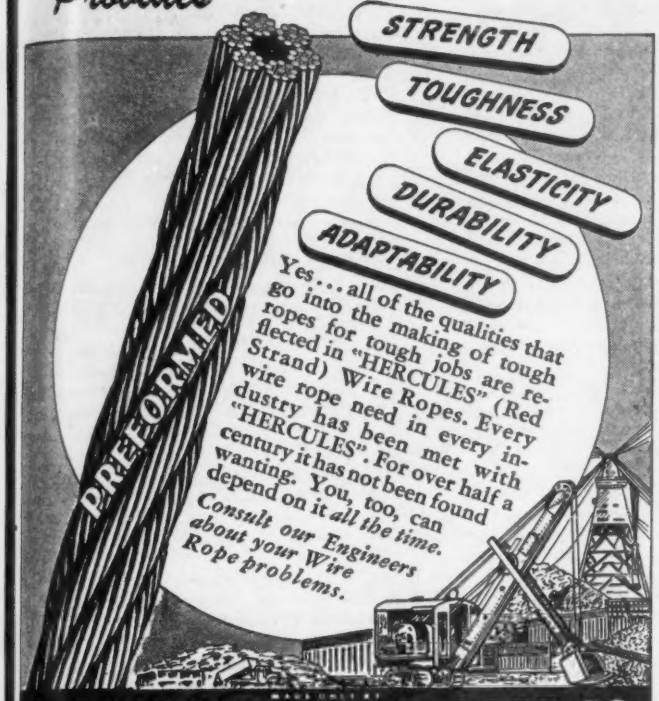
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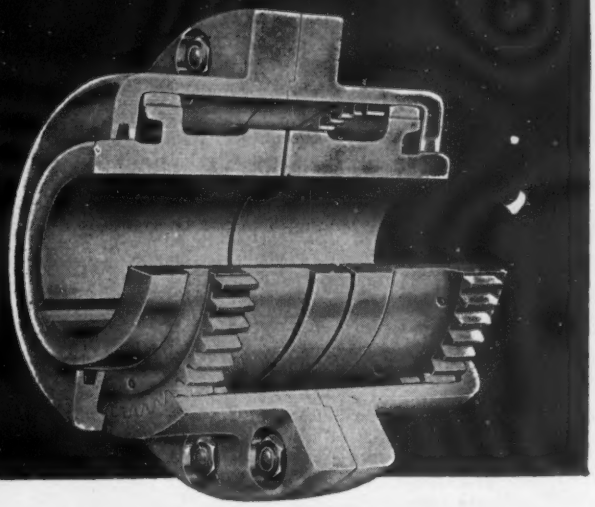

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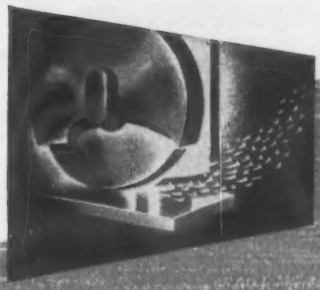
FLEXIBLE COUPLINGS

POOLE FOUNDRY & MACHINE COMPANY — WOODBERRY, BALTIMORE, MD.



Now You Can Measure Your Surface Finishes... From Less Than 1 to 5000 Microinches!

● The Surface Analyzer* checks surface finish from less than 1 to 5000 microinches! Permanent, instantaneous direct-inking oscillograph chart record is obtained by exploring surface with diamond point—the motion of which is magnified and recorded on a moving paper chart. In cases where "peak and valley" chart profiles are not needed, the Brush "RMS" meter provides a constant visual check of average surface roughness.

Human error is eliminated by accurate power-driven pickup, chart record and calibration in terms of an absolute standard.

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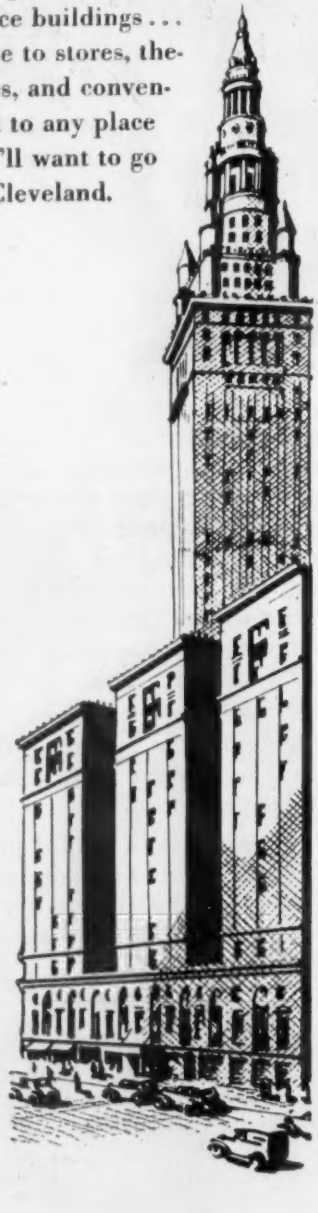
a quiet, comfortable, sleep-inviting room . . . right in the heart of downtown Cleveland. Hotel Cleveland adjoins Union Passenger Terminal, garage and Terminal office buildings . . . close to stores, theatres, and convenient to any place you'll want to go in Cleveland.



HOTEL CLEVELAND
Cleveland, Ohio

National Bank Bldg., has been incorporated with $100,000 capital to manufacture plumbing fixtures and supplies, by Robert M. Zell, 1237 Temple Ave.

DETROIT—Cardinal Products Corp., 1863 Penobscot Bldg., has been incorporated with $50,000 capital to manufacture metal products, by H. D. Brotman, 18075 Kentucky Ave.

DETROIT—Reason Tool Co., 2862 East Grand Ave., has been incorporated with $20,000 capital to manufacture tools, dies and fixtures, by Clair D. Reason, same address.

DETROIT—Supreme Gas Burner Mfg. Co., 517 Dime Bldg., has been incorporated with $20,000 capital to manufacture gas burners and tools, by Virgil R. Jones, 1443 Hampton Rd., Grosse Pointe Woods, Mich.

DETROIT—Velvalite Industries Inc., 14471 Livernois Ave., has been incorporated with $50,000 capital to manufacture electrical switches, by Paul Drake, 10201 Roxbury Ave.

DETROIT—Flexible Products Co., 8881 Central Ave., has been incorporated with $150,000 capital to manufacture flexible bushings and couplings, by Arthur C. Pacific, 9282 West Outer Drive.

JACKSON, MICH.—Burdon Corp., 117 Clinton Ave., has been incorporated with $50,000 capital to manufacture metal products and conduct a machine shop, by James H. Dawson, 801 South Webster St.

LINCOLN PARK, MICH.—Coughlan Products Corp., 1469 Electric Ave., has been incorporated with 1000 shares no par value to manufacture tools, toys and household appliances, by John A. Coughlan, 1841 Elizabeth Ave., Dearborn, Mich.

LINCOLN PARK, MICH.—Brooks Machine Products Co., 1584 Marion Ave., has been incorporated with $50,000 capital to manufacture screw machine products, by Verne Brooks, same address.

MINNESOTA

ALEXANDRIA, MINN.—H. S. Campbell, city clerk, has let contract to Nordland & Ahlberg, Starbuck, Minn., for a sewage treatment plant to cost about $150,000.

MINNEAPOLIS—Standard Iron & Wire Works, 1900 NE Third St., has let contract to G. F. Cook Construction Co., 2608 Nicollet Ave., for a 100 x 200-foot plant building to cost about $120,000.

MISSOURI

ST. LOUIS—Texas Co., has obtained permission from the board of public service for erection of a 6,160,000-gallon bulk oil storage plant on the river front, to cost about $1,500,000. Eight large steel storage tanks are included, with a pumping system from tanks to barge docks.

NEW JERSEY

GARWOOD, N. J.—National Gypsum Co., 420 Lexington Ave., New York, has let contract to Andrew Christenson & Son, 1140 East Jersey St., Elizabeth, N. J., for a plant addition to cost about $60,000.

OHIO

CLEVELAND — Superior Die Castings Co., 17325 Euclid Ave., has let contract to Sam W. Emerson Co., 1836 Euclid Ave., for a 70 x 300-foot plant building to cost about $200,000.

CLEVELAND—Louis R. Elrad, 6706 Detroit Ave., has plans under way for production of small three-wheeled auto, designed especially as delivery car.

CLEVELAND—Cleveland Forged Products Co. has been incorporated with 600 shares no par value by Rufus S. Day Jr., 1503 Midland Bldg., to operate a forging business.

CLEVELAND—Cleveland Co-Operative Stove Co., 2323 East 67th St., James Mitchell, president, is building a new core production plant, to cost about $350,000, with equipment.

CLEVELAND—Hydraulic Equipment Co., 11 East 222nd St., is building a one and two-story plant addition to increase manufacturing space, in which new equipment will be installed. Hall Kirkham is president. Company manufactures oil hydraulic systems.

CLEVELAND—Basic Aluminum Castings Co. has been incorporated by Harold S. Beebe, 8802 Harkness Rd., to manufacture and machine metal products.

CLEVELAND—M. B. M. Foundry Inc., 4730 Warner Rd., Garfield Heights, O., has been organized by James Goldie and associates to manufacture high-test gray iron castings.

CLEVELAND—Hornsby Riggs Co. has been incorporated by William H. Brown, 17591 Broadway Ave., and associates, to manufacture tools.

CLEVELAND—Chesapeake & Ohio Railroad, R. J. Bowman, president, Terminal Tower, has authorized expenditure of $834,000 for additional machinery in its car shops at Russell, Ky., for fabricating steel for car repairs.

CLEVELAND—Republic Brass Co., 1617 East 45th St., Richard A. Blywise, president, will build a 150 x 150-foot building to cost about $75,000.

LODI, O.— Lodi Foundry Co., recently incorporated to manufacture aluminum castings, will occupy a new building 40 x 120 feet on Ohio St., for which new equipment is being purchased. (Noted Sept. 30.)

LORAIN, O.—Thew Shovel Co., East 28th and Fulton Sts., will build a plant addition to cost about $175,000.

NILES, O.—American Brake Shoe Co. is building a plant for manufacture of locomotive and car parts. Contract has been let to James Stewart & Sons Co., New York. Cost is estimated at about $200,000.

WILLOUGHBY, O.—Willoughby Machine & Tool Co., 15 Second St., has CPA approval for a new plant costing about $50,000, at Church and Elm Sts. Company manufactures thermomatic heating units.

YOUNGSTOWN, O.—Temperature Controllers Inc. has been incorporated with 1000 shares no par value, by Arthur J. Sweeney, 148 Alburn Dr., to manufacture air conditioning and ventilating equipment.

YOUNGSTOWN, O.—East Ohio Gas Co., 1405 East Sixth St., Cleveland, J. F. Robinson, president, announces a $10 million natural gas line, with a pressure reducing station near Austintown, O.

YOUNGSTOWN, O.—Harris Fabricating Co. has been incorporated with $10,000 capital by Frank Harris, 818 Lyden Ave., to manufacture steel water and fuel tanks and lawn rollers.

OREGON

MILTON, OREG.—City has rejected bids as too high for a municipal sewage treatment plant and new bids will be asked.

PORTLAND, OREG. — Pacific Telephone & Telegraph Co. has plans by Whitehouse, Church, Newberry & Roehr, Portland, for two exchange buildings in East Portland, to cost about $1,300,000, including $650,000 for equipment.

PENNSYLVANIA

ERIE, PA.—Standard Stoker Co., 1701 Gaskell Ave., will build two additions, 48 x 98 feet and 33 x 59 feet, to cost about $44,000.

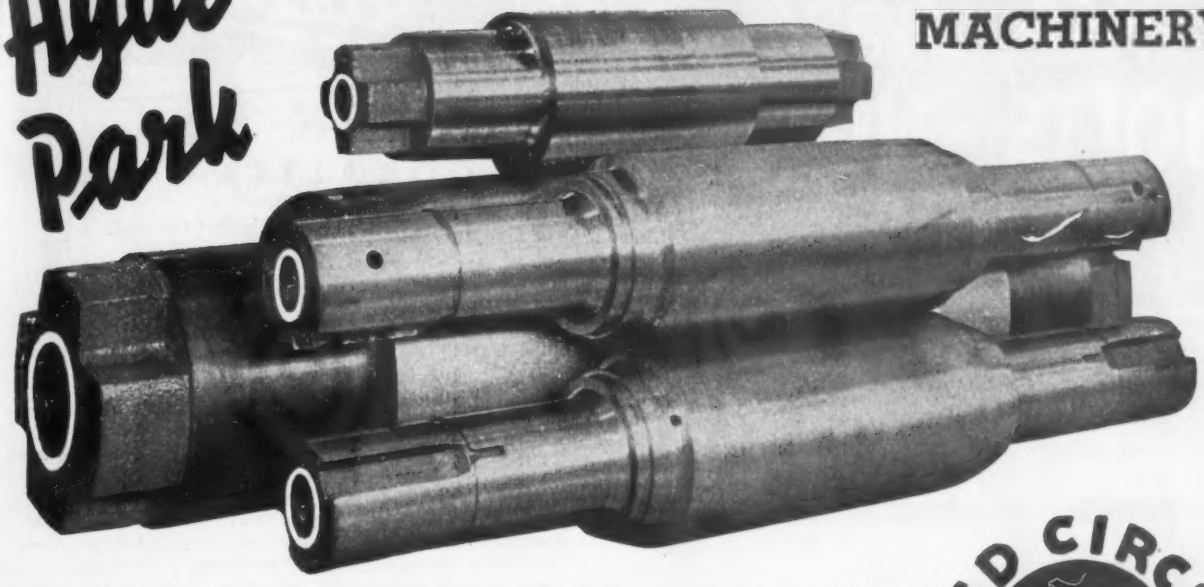
PHILADELPHIA—Sharpless Corp., Westmoreland and 23rd Sts., has let contract to Barclay White Co., 22 North 36th St., for a 70 x 180-foot plant building, to cost about $90,000. I. S. Towsley, 112 South Sixteenth St., is engineer.

PITTSBURGH—Pittsburgh Plate Glass Co., 632 Duquesne Way, Harry B. Higgins, president, will build a plant 200 x 500 feet adjacent to its main works, for manufacture of its double-glazed insulating window unit, at cost of about $750,000. Austin Co., Cleveland, is architect and general contractor.

TRAFFORD, PA. — Westinghouse Electric Corp., Union Bank Bldg., Pittsburgh, has let separate contracts for a 105 x 175-foot plant addition to cost about $80,000.

Hyde Park

CHILLED ROLLS and ROLLING MILL MACHINERY



RED CIRCLE Rolls CHILLED

"Red Circle" heat treated Alloy and Plain Chilled Rolls for three and four-high Mills, Sheet and Tin Mills. Moly Rolls, Nickel Chilled, Grain Rolls, Cold Rolls and Sand Rolls.

Sheet and Tin Mill Shears of all kinds, Roll Lathes, Steam Doublers, Sheet Pack Carriers, Stretcher Levellers and Rolling Mill Machinery built to specifications.

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This is How

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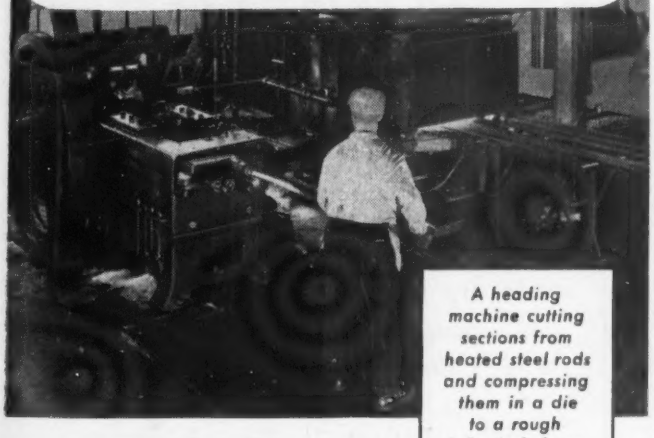

A heading machine cutting sections from heated steel rods and compressing them in a die to a rough spherical shape

The steel is carefully chosen and inspected, even before it gets to the heading machine. After being "born" here, balls are carefully "brought up," through a long series of grinding and lapping operations, to the unbelievably high standards of finish, sphericity and precision which have made Strom Metal Balls the standard of industry. Strom Steel Ball Co., 1850 So. 54th Avenue, Cicero 50, Illinois.

Strom BALLS Serve Industry

Largest Independent and Exclusive Metal Ball Manufacturer

FRONT LEVER BENCH PUNCH

Immediate Shipment

The endurance and practicability of this machine have established it as a favorite in the metal-punching trades.

Hand Operated Weight 70 lbs.
Capacity 3/8" hole through 5/16" metal

Punches and dies are carried in stock in a large range of sizes. New sizes are constantly being added to the line as the demand for them develops.

Present Range of Front Lever Punches and Dies

Round 1/16" to 1/2" by 1/64ths. and No. 30, No. 24, and No. 19 Drill Size

Flat	Regular Oval	Semi-Circular End Oval		Square	
3/8" x 1/4"	1/2" x 5/16"	1/2" x 5/16"	11/32" x 9/32"	3/8"	17/64"
5/16" x 1/4"	1/2" x 9/32"	1/2" x 9/32"	11/32" x 7/32"	11/32"	1/4"
5/16" x 3/16"	1/2" x 3/16"	1/2" x 7/32"	5/16" x 1/4"	21/64"	7/32"
1/4" x 3/16"	1/2" x 5/32"	1/2" x 3/16"	5/16" x 9/64"	5/16"	3/16"
	13/32" x 9/32"	1/2" x 5/32"	9/32" x 7/32"	9/32"	5/32"
					9/64"

Send for catalog No. 8 on other Lewthwaite Tools

T. H. LEWTHWAITE MACHINE CO., INC.
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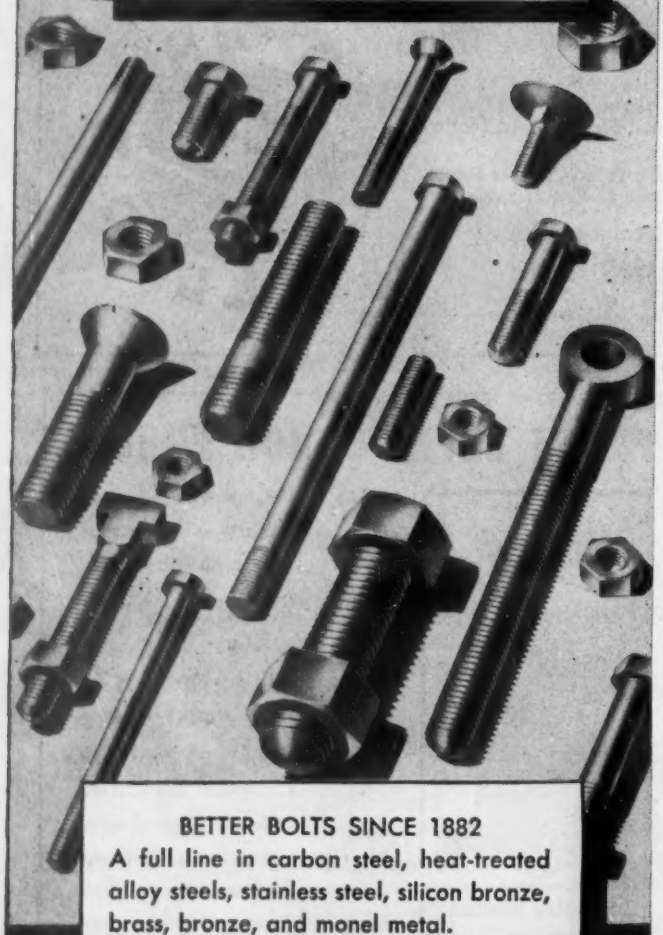
USE HEADED AND THREADED FASTENERS FOR ECONOMY AND RELIABILITY

Alloy Steel
BOLTS · NUTS STUDS

Every standard alloy steel—fabricated into bolts, nuts, studs and many special fastenings. Accurately made in standard dimensions or to meet your specifications.



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A full line in carbon steel, heat-treated alloy steels, stainless steel, silicon bronze, brass, bronze, and monel metal.

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THE PLACE TO SOLVE YOUR BOLT PROBLEMS

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PRK-33
COBALTCROM
Air-Hardening, Non-Deforming, Cobalt High-Carbon, High Chromium Steel

A steel for blanking, forming, drawing, trimming and shearing tools. Recognized as the leader in its field, PRK-33 has extremely long life in dies and is unsurpassed on quantity production runs. Simple to heat treat with uniform hardness penetration to the center and secondary hardness. Has high tensile strength and great resistance to abrasion.

FURNISHED IN BAR STOCK, BILLET, FORGING, CASTING AND WELDING ROD.
BULLETIN ON REQUEST

Representatives in New York City, Plainville, Philadelphia, Pittsburgh, Detroit, Orlando, Chicago, Indianapolis, Milwaukee, St. Louis and Los Angeles.

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highest grade tool steels
1260 W. FOURTH ST. CLEVELAND 13, OHIO

$(2\frac{7}{16} \times 7) \times (4\frac{7}{8} \times 3\frac{5}{16}) =$

$17\frac{1}{16} \times (\frac{39}{8} \times \frac{53}{16}) = 17\frac{1}{16} \times \frac{2067}{128}$

$17\frac{1}{16} \times 16\frac{19}{128} = \frac{273}{1} \times \frac{2048}{128} = 275.5327$

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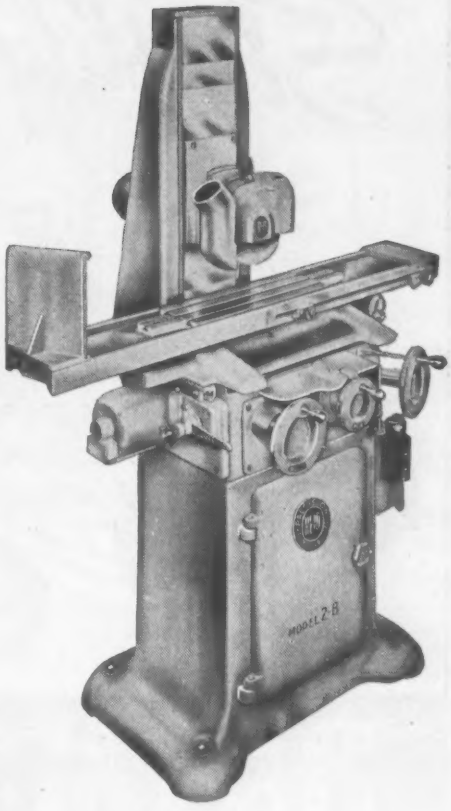
PRECISION REID SURFACE GRINDERS

CONTROLS
"at Your Fingertips"



IT'S A RARE OCCASION when replacement parts are necessary for Reid Precision Surface Grinders.

Moving parts are mounted in Timken Tapered Roller Bearings, Ball-Bearings and Oilite Bushings.

All shafts are hardened and ground.

Efficient, Simplified, Lubrication.

These important features assure you exceptional Precision results, extra long wearing qualities, and ease of operation with controls

"At Your Fingertips."

ILLUSTRATED IS THE REID MODEL 2-B ALL-ELECTRIC POWER-FEED

The Reid Model 2-C hand-feed also is an exceptionally fine machine for tool, gage, die and certain production grinding.

MACHINES EQUIPPED FOR WET GRINDING IF REQUIRED

EXCELLENT DELIVERIES

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Welding Efficiently ??

— Not Until You Check Your Welding Cables and . . . .

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"TWECOTONG" and **"HOLGRIP"** plain and fully insulated Electrode Holders are cool running, well balanced, easy to operate, moderately priced. Sizes range from 150 to 500 amperes. 1/32 thru ⅜" Electrodes.

TWECO "REDHEAD" Ground Clamps are made in Midget 125 ampere, Jr. 300 and Sr. 500 amperes sizes. Provide a quick, positive and portable ground. Truly an efficiency "stepper-upper."

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"TWECOLUGS" mechanically and positively "lug" your cables. No solder — no heat — No mess. Made in Hole and Open Side types for from small No. 4 thru 4/0 cables.

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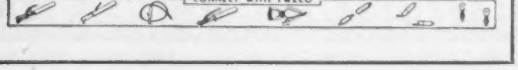
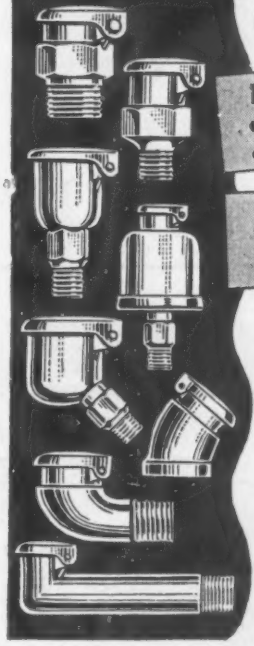


Oiler **SPECIALIZATION** *means –*



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Exclusive for over 35 years

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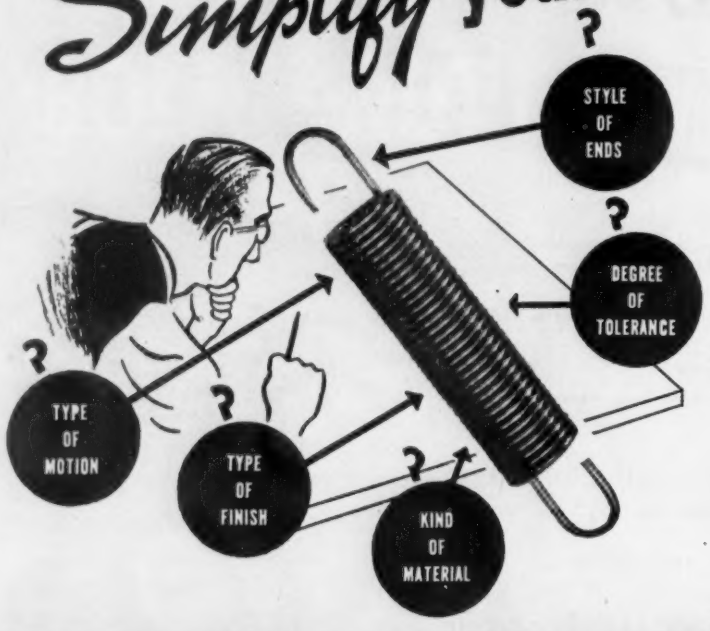

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You save the time and expense of "trial-and-error" methods. You get the advantage of wide experience in the selection and use of spring materials, platings and finishes. And you benefit by production facilities newly enlarged to give even better service, whether your order is large or small.

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RAYMOND SPRINGS

COWLES

ROTARY SLITTING KNIVES
for Modern Requirements
Highest Quality . . . Long Service
The Product of Many Years Specialization
MADE BY TOOL MAKERS
Also Manufacturers of
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300 TWIN BENDS per hour!

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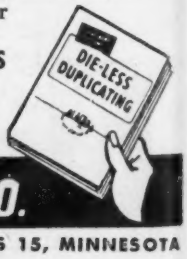

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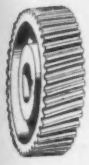
You get years and years of trouble-free performance from "Industrial" gears because they are cut right and run true.



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GEARS, RACKS, SPROCKETS combine a wealth of gear cutting knowledge. Our machinists are skilled in their specialty. In workmanship, materials, precision and finish you get what you specify. Pin point perfection is assured by rigid inspection. Our machines and production facilities are the last word—result SERVICE that SATISFIES.

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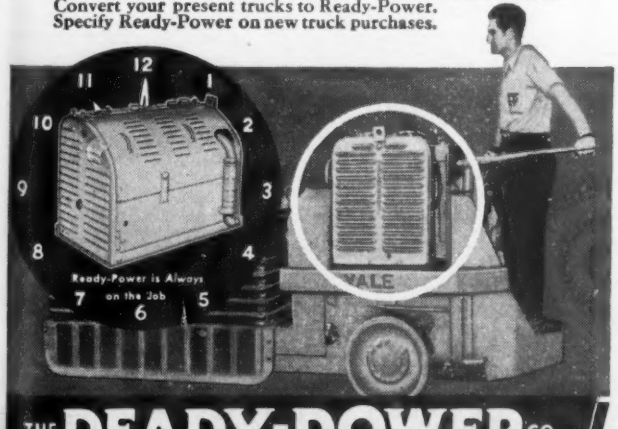
Electric Truck Operation Made Even MORE Efficient

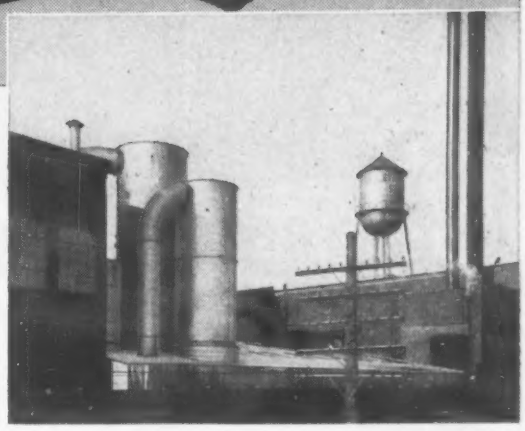
READY-POWER Gas-Electric Units Generate Electric Power Right on the Truck Chassis

Electric trucks are "ahead of the field" in effective materials-handling. Ready-Power Units (in place of batteries) on electric trucks will substantially improve their performance. These units generate an unlimited amount of electric power right on the truck chassis thereby making smooth, top speed performance available *every hour of the day.* This means more work accomplished per man-hour . . . greater economy . . . more all around satisfaction. Ready-Power Units, for any type of job, can be installed on any make of electric truck. Convert your present trucks to Ready-Power. Specify Ready-Power on new truck purchases.



THE READY-POWER CO.
3824 Grand River Ave., Detroit 8, Michigan

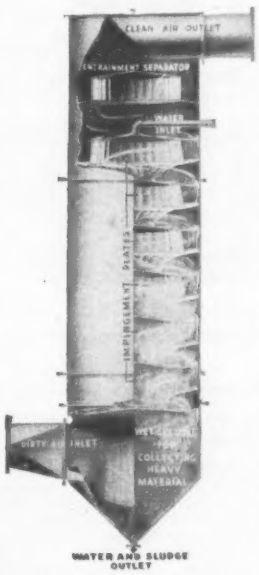
GIVE YOUR PLANT A PERMANENT AIR CLEANING



GOOD working conditions — *always profitable* — are essential now, and will become even more important as competition becomes keener.

Clean air for all operations is the basis of good working conditions. Contaminated air sharply reduces production and employee efficiency. It follows then that only the most effective and permanent dust control equipment is suitable to your requirements.

Schneible Multi-Wash Dust Collecting Systems, operating on the sound principle of bringing dirty air in intimate contact with water, are the most logical mediums for eliminating dust and fumes. They have withstood every test for over a quarter of a century. They are highly efficient in removing contaminated air from the working zones, and simply dispose of collected dust and fumes.



There are no parts in Schneible collectors to break, burn, clog or rapidly wear. Schneible systems are low in final cost because they require practically no attendance and a very minimum of maintenance. The water or other washing liquid is reclaimed for repeated use in the collector system.

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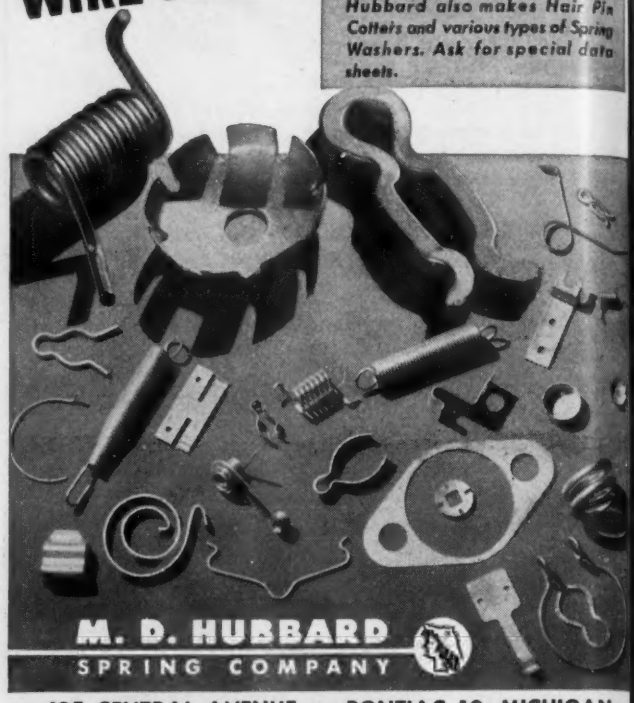

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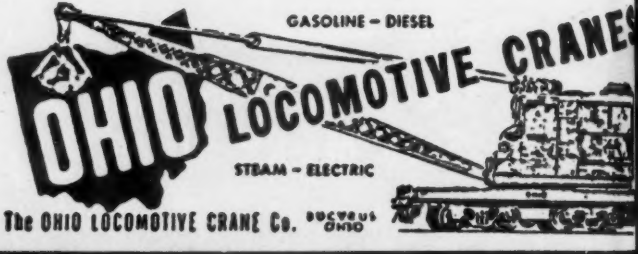

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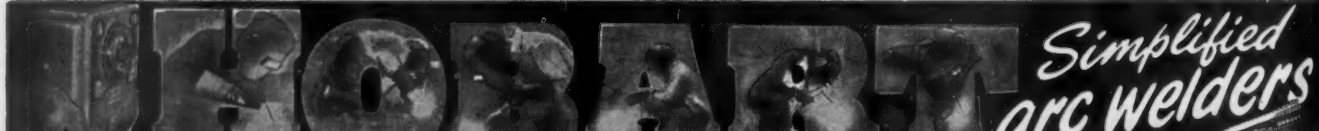

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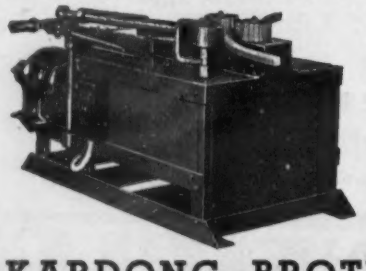

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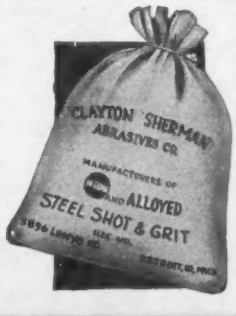

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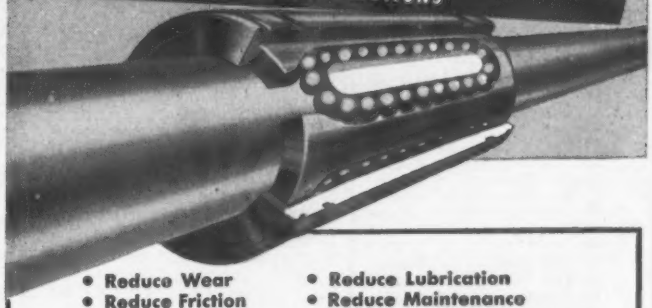

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25-Ton P&H 70' Span
25-Ton Whiting 106' Span
25-Ton Whiting 82' Span
20-Ton Alliance 77' Span
20-Ton Cleveland 65' Span
20-Ton Morgan 77' Span
20-Ton Northern 60' Span
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20-Ton Shaw 76'4" Span
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15-Ton Alliance 35' Span
15-Ton Cleveland 55'6" Span
15-Ton Cleveland 35' Span
15-Ton Morgan 77' Span
15-Ton Niles 32' Span
15-Ton Northern 53' Span
15-Ton Shaw 82' Span
15-Ton Shaw 77' Span
15-Ton Toledo 82' Span
15-Ton Whiting 74'8 ½" Span
12-Ton Morgan 56' Span
10-Ton Alliance 88'9" Span
10-Ton "American" 27' Span
10-Ton Case 31'9" Span
10-Ton Cleveland 38' Span
10-Ton Cleveland 50' Span
10-Ton Lane 50' Span
10-Ton Morgan 39'5" Span
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5-Ton Milwaukee 70' Span
5-Ton Northern 49'6" Span
5-Ton P&H 45' Span
5-Ton Shaw-Box 26' Span
5-Ton Shepard 40' Span
5-Ton Toledo 96' Span
5-Ton Whiting 80' Span
3-Ton P&H 46'4" Span
3-Ton Shaw 33' Span
3-Ton Whiting 57'3" Span
2-Ton Detroit 28' Span
2-Ton Louden 19'2" Span
2-Ton P&H 46'4" Span
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Stock No.	Qty.	Size	Length	Weight	Analysis
ANGLES					
A-13	36	9" x 4" x 9/16"	40'0"	33,235	SAE 1020
HARD STEEL FLAT (Of Forging, Threading, Machining Quality)					
HSF-1		1-1/4" x 3/8"	R/L	3,150	NE 8620
HSF-2		1-5/8" x 5/8"	R/L	7,925	"
HSF-3		1-1/4" x 5/8"	R/L	700	"
HSF-4		1-5/8" x 3/4"	R/L	340	"
JAIL BARS					
JB-1		7/8"	R/L	6,665	NE 8630
JB-2		1"	R/L	7,885	"
JB-3		1-1/8"	R/L	2,400	"
OCTAGON					
O-1		7/8"	R/L	3,600	SAE 1020
O-2		13/16"	R/L	2,850	"
O-3		3/4"	R/L	3,075	NE 9261
O-4		13/16"	R/L	8,450	"
ROUND ALLOY STEEL (Of Forging, Threading, Machining Quality)					
RA-1		7/8"	R/L	370	NE 8620
RA-2		3/4"	"	230	"
RA-3		1-5/16"	"	2,900	"
RA-4		1-1/4"	"	500	"
RA-5		1-3/8"	"	370	"
RA-6		1-1/8"	"	2,225	"
RA-7		1-3/16"	"	1,350	"
RA-8		1-1/8"	"	925	"
RA-9		1-1/4"	"	1,225	"
RA-10		1"	"	4,390	"
RA-11		3/4"	"	430	"
RA-12		15/16"	"	6,930	"
RA-13		7/8"	"	900	"
HEXAGON					
H-1		1-1/8"	R/L	280	NE 9261
COAL SCREEN BARS					
CSB-1		No. 3	R/L	480	
SQUARES					
S-2		7/8"	R/L	4,000	SAE 1020
FORGING BILLETS					
FB-1	300	2-1/2" x 2-1/2"	3-3/4"	1,976	SAE 1020
ROUNDS					
R-1		1"	R/L	5,200	SAE 1020
R-2		5/8"			
FLAT IRON					
F-1		1-1/8" x 3/4"	R/L	570	SAE 1020
F-2		1-1/2" x 5/8"	"	100	"
F-3		1-1/4" x 1/2"	"	1,907	"
F-4		1-1/8" x 5/8"	"	57	"
F-5		7/8" x 5/8"	"	45	"
F-6		1-1/8" x 3/8"	"	21	"
F-7		7/8" x 3/4"	"	2,040	"
F-8		4" x 3/8"	"	2,000	"
F-9		3-1/2" x 3/8"	"	350	"
F-10		5" x 5/16"	"	360	"

Stock No.	Qty.	Size	Length	Weight	Analysis
FLAT IRON (Continued)					
F-14		4" x 3/4"	"	1,120	"
F-17		1-1/4" x 1"	"	6,500	"
F-18		1" x 3/4"	"	410	"
F-19		1-3/8" x 1"	"	1,000	"
F-20		3-1/4" x 3/4"	"	3,100	"
F-21		4-1/2" x 3/4"	"	750	"
F-22		3" x 3/16"	"	690	"
F-23		1-3/8" x 3/4"	"	2,220	"
F-24		5" x 3/8"	"	1,320	"
F-25		2" x 5/8"	"	350	"
F-26		1-1/2" x 3/4"	"	1,000	"
F-27		4" x 3/8"	"	1,050	"
F-28		2-1/2" x 5/8"	"	1,000	"
ROUND EDGE FLAT STEEL					
REF-1		2-7/8" x 3/4"	R/L	210	SAE 1020
REF-2		2-3/4" x 5/8"	"	68	"
REF-3		2-1/4" x 5/8"	"	63	"
REF-4		1-1/2" x 3/4"	"	65	"
REF-5		1-1/2" x 1/2"	"	35	"
REF-6		1-1/4" x 7/16"	"	20	"
REF-7		2" x 5/8"	"	70	"
REF-8		1-3/8" x 3/4"	"	48	"
REF-9		2-1/2" x 1/2"	"	44	"
REF-10		1-7/8" x 5/8"	"	30	"
REF-11		1-1/2" x 1"	"	60	"
REF-12		1-1/4" x 3/4"	"	67	"
REF-13		3-1/4" x 1/2"	"	150	"
REF-14		2-7/8" x 5/8"	"	100	"
REF-15		2-1/2" x 1"	"	55	"
REF-16		2-1/2" x 5/8"	"	300	"
REF-17		1-3/4" x 3/4"	"	1,400	"
REF-18		2-3/4" x 3/4"	"	1,025	"
REF-19		1-3/4" x 3/4"	"	325	"
REF-20		1-3/4" x 5/8"	"	425	"
REF-21		2" x 7/8"	"	410	"
REF-23		1-5/8" x 7/16"	"	110	"
REF-24		1-3/4" x 7/8"	"	1,575	"
REF-25		1-3/4" x 3/4"	"	830	"
REF-26		1-1/2" x 3/4"	12/15	2,730	"
REF-27		1-5/8" x 3/4"	R/L	2,840	"
REF-28		2-1/2" x 5/8"	"	280	"
REF-29		2-1/2" x 3/8"	"	230	"
REF-30		1-7/8" x 5/8"	"	475	"
REF-31		2-1/4" x 7/8"	"	400	"
REF-32		1-1/8" x 3/8"	"	80	"
REF-33		2-3/4" x 7/16"	10'8"	420	"
REF-34		2-3/4" x 7/16"	12'0"	5,720	"
REF-35		2-3/8" x 5/8"	11'0"	1,040	"
REF-36		1-7/8" x 5/8"	12' & 15'	3,330	"
PIPE					
P-1	1	10" dia. Ex. Hvy. 1/2" wall	11'4-1/2"		Black
P-2	1	10" dia. Ex. Hvy. 1/2" wall	6'6"		"
P-3	1	10" dia. Std. 9/32" wall	6'5"		"
P-4	1	10" dia. Ex. Hvy. 7/16" wall	10'0"		"
P-5	1	14" dia. Ex. Hvy. 1/2" wall	29'0"		"
P-6	1	14" dia. Ex. Hvy. 1/2" wall	26'7"		"

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TRinity 4713

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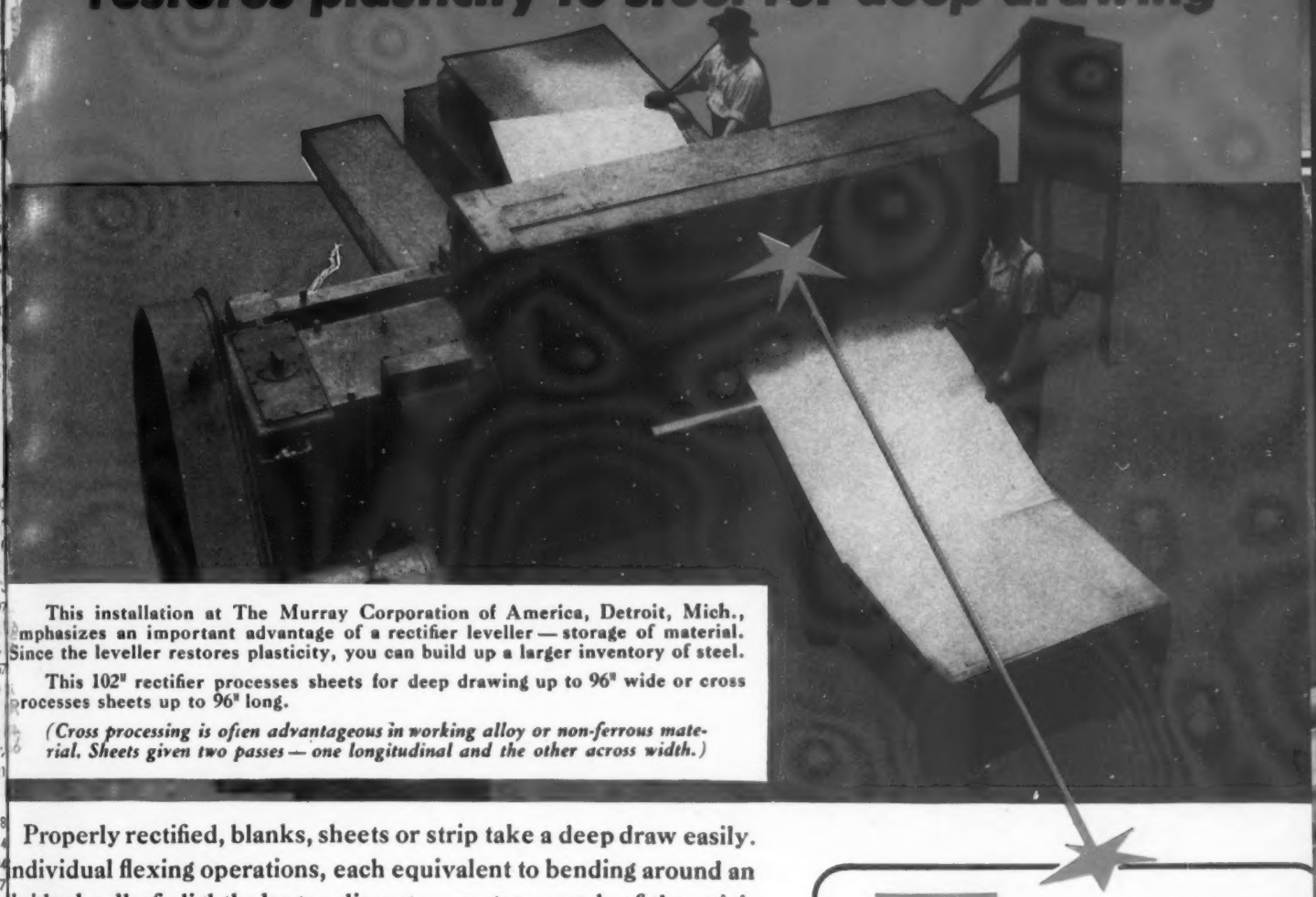
RECTIFIER LEVELLER

restores plasticity to steel for deep drawing



This installation at The Murray Corporation of America, Detroit, Mich., emphasizes an important advantage of a rectifier leveller — storage of material. Since the leveller restores plasticity, you can build up a larger inventory of steel.

This 102" rectifier processes sheets for deep drawing up to 96" wide or cross processes sheets up to 96" long.

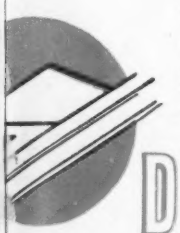
(Cross processing is often advantageous in working alloy or non-ferrous material. Sheets given two passes — one longitudinal and the other across width.)

Properly rectified, blanks, sheets or strip take a deep draw easily. ndividual flexing operations, each equivalent to bending around an ividual roll of slightly larger diameter, restore much of the origi- plasticity, thereby eliminating most hand finishing after drawing.

Blanks of any shape, sheets or strip can be uniformly processed without distortion. There is no unprocessed portion of the leading end of the material.

Entering brush rolls and automatic spray cleans and oil-coats material as the steel moves through the rectifier leveler.

Aetna-Standard, largest manufacturers of levellers, developed the rectifier leveller 13 years ago for the automobile industry. Since then, many improvements have been made in the original design. Put a rectifier leveller to work for you and eliminate many deep drawing headaches. Ask Aetna-Standard for recommendations.



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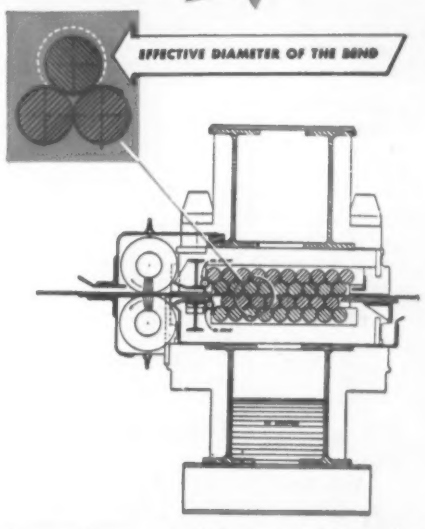
THE AETNA-STANDARD ENGINEERING CO. YOUNGSTOWN, OHIO

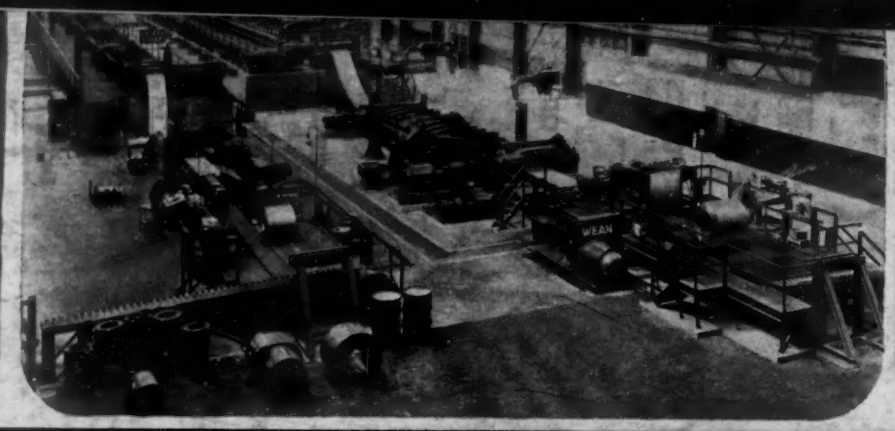
ASSOCIATED COMPANY

HEAD, WRIGHTSON & COMPANY, LIMITED MIDDLEBOROUGH, ENGLAND



As every increment of the material flows through the effective bend area, no further increase in the wrap around roll can increase the internal work in the material. The smaller diameter roll used, the greater the processing obtained. We use smallest diameter rolls practical for the gauges to be processed. 57 backing up rolls and 114 bearings permit use of these extremely small diameter work rolls.

Aetna-Standard



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Warren, Ohio

Subsidiary Company THE BRODEN CONSTRUCTION CO. CLEVELAND, OHIO

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Experience has proven that the use of Wean Pickling Equipment results in increased production with lower pickling costs per ton.

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SHEET, STRIP and TIN MILL